ARIZONA DEPARTMENT OF TRANSPORTATION

REPORT NUMBER: FHWA-AZ88-207

SIMPLIFIED BRIDGE LOAD RATING METHODOLOGY USING THE NATIONAL BRIDGE INVENTORY FILE

Volume I: Users Manual

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1. REPORT NO. FHWA-AZ87-207, I	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
4. TITLE AND SUBTITLE SIMPLIFIED BRIDGE LOAD RATING METHODOLOGY USING THE NATIONAL BRIDGE INVENTORY FILE VOLUME I: USERS MANUAL		5. REPORT DATE August 1987
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Roy A. Imbsen, Robert A. Schamber		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Imbsen & Associates, Inc. 3213 Ramos Circle Sacramento, CA 95827		10. WORK UNIT NO.
		11. CONTRACT OR GRANT NO. HPR-PL-1(31)ITEM 207
12. SPONSORING AGENCY NAME AND ADDRESS ARIZONA DEPARTMENT OF TRANSPORTATION 206 S. 17TH AVENUE PHOENIX, ARIZONA 85007		13. TYPE OF REPORT & PERIOD COVERED Final Report
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration

16. ABSTRACT

The purpose of this research was to develop a computerized system to determine the adequacy of a bridge or group of bridges to carry specified overload vehicles. The system utilizes two levels of analysis. The Level 1 analysis is the basic rating system for the Arizona Department of Transportation. This analysis computes the overload capacity with a limited amount of data. A Level 2 evaluation, which conducts a more detailed evaluation, uses an enhanced NBIF database, Standard Plans, or a more detailed analysis similar to Brass. A Special Level 2 analysis was also developed to analyze continuous slab bridges by utilizing data from standard slab plans.

Detailed case studies were conducted on twenty-five typical Arizona bridges to verify the methodology used in the Level 1 procedure and to correlate the bridge plans with data in the NBIF. The Level 1 procedure gives ratings which are within 10% of the Level 2 procedure for bridges which satisfy the level one assumptions. Similarly, the Special Level 2 analysis for reinforced concrete continuous bridges gives ratings within 10% of the Level 2 analysis. The NBIF compared well with general bridge plans and is applicable to Level 1 analysis for "typical bridges".

The research results are reported in three documents:
1. Final Report
2. Volume I: Users Manual
3. Volume II: Program Listing

17. KEY WORDS Overload, Bridge Rating, National Bridge Inventory Analysis	18. DISTRIBUTION STATEMENT Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161

19. SECURITY CLASSIF. (of this report) Unclassified	20. SECURITY CLASSIF. (of this page) Unclassified	21. NO. OF PAGES 108	22. PRICE

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1.0 INTRODUCTION

1.1 Purpose of the Program

The FORTRAN-77 computer program, OVERLOAD, computes overload vehicle load capacity ratings based on the operating rating obtained from the NBIF (National Bridge Inventory File) for various overload configurations. Considering both the required response time and the number of bridges on the Arizona State Highway System, a Level 1 evaluation will be the basic rating system. The advantage of the Level 1 evaluation is that it computes the overload rating capacity rapidly with a limited amount of data. A Level 2 evaluation, which conducts a more detailed evaluation, would use an enhanced NBIF data base, standard plans, or a more detailed frame analysis similar to BRASS. OVERLOAD currently conducts a Special Level 2 analysis for continuous slab bridges by utilizing data from standard slab plans.

1.2 Rating Methodology

The Level 1 procedure transforms the given load capacity ratings for the specified vehicles as contained in the NBIF at the operating level into the overload load ratings. This procedure is expressed mathematically as:

$$OVLDRR = T*RF_{op}$$

where

OVLDRR = Overload rating ratio calculates the bridge capacity as a decimal fraction of the overload vehicle. A value of 1.0 indicates that the bridge has the capacity to support the overload vehicle. Values between 0.7 and 1.0 indicate potential under capacity, but are inconclusive for a given bridge unless a more detailed Level 2 evaluation is considered. Values under 0.70 indicate an inadequate capacity to support overload vehicles.

T = Function transforming the AASHTO load rating factor, RF_{op}, to the OVLDRR.

RF_{op} = Rating factor contained in NBIF at the operating level that indicates the capacity of the bridge as a decimal fraction of the rating vehicle.

The transformation function, T, which takes into account the difference in the load effects of the overload and the rating vehicles is expressed mathematically as:

$$T = f(R_L, C, R_T, R_I) = \frac{1}{R_L C R_T R_I}$$

where

R_L = Ratio of the controlling simple span longitudinal response of the overload vehicle to that of the rating vehicle.

C = Correction factor applied to continuous bridges.

R_T = Ratio of the transverse load distribution factor of the overload vehicle to the AASHTO design vehicle.

R_I = Ratio of the impact effects of the overload vehicle to the AASHTO design formula.

The Special Level 2 procedure uses standard reinforced concrete slab plans to calculate the overload rating capacity. This procedure is expressed mathematically as:

$$OVLDRR = \frac{M_{CAPACITY} - M_{DL}}{M_{(LL+I)} R_T R_I}$$

where

OVLDRR = Overload rating ratio that is calculated directly. The values of OVLDRR limits are similar to those of the Level 1 procedure.

$M_{CAPACITY}$ = Working stress moment capacity calculated from standard plans for a unit foot width.

M_{DL} = Dead load moment calculated from standard plans for a unit foot width.

$M_{(LL+I)}$ = AASHTO live load plus impact moment using a three-span influence line.

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R_T = Ratio of the transverse load distribution factor of the overload vehicle to the AASHTO design vehicle.

R_I = Ratio of the impact effects of the overload vehicle to the AASHTO design formula.

1.3 Assumptions

The following assumptions for the program are made for the Level 1 evaluation and Special Level 2 analysis:

1) Level 1 is applicable to those types of bridges designed or constructed as "slab," "stringer/multi-beam or girder," "girder and floorbeam system," "T-beam," "box beam or girders-multiple," "box beam or girders-single," and "culverts." Also Level 1 is applicable to those types of bridges designed with materials as "concrete," "steel," "prestress concrete," and "timber." Bridges not applicable to those bridge types are screened for a Level 2 analysis which requires a more detailed evaluation (i.e. BRASS). The overload rating in Level 1 is applicable to primary members in the bridge, while secondary members are ignored.

2) Special Level 2 analysis is applicable to reinforced concrete continuous slab bridges that have three or more spans and that were designed using Arizona standard plans. The controlling rating is assumed not to be effected by hinges in the bridge.

3) AASHTO impact and load distribution formulae are used in the NBIF. For girder type bridges the girder spacing is assumed constant from span to span.

4) The operating rating in the NBIF is coded correctly and that it is based only on the flexure mode using AASHTO working stress method of design. The operating rating for bridges that have been administratively rated (i.e. $RF_{IN} = RF_{op} = 236$) and that are coded with structural conditions of 7 and greater will be increased by a factor of 1.36 (i.e. 0.75/0.55).

5) The overload vehicle is assumed to be able to cross the bridge with no clearance restrictions. Bridges are only checked for vehicle width

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clearance based on the curb-to-curb width and approach span width. The program will print a warning if these limitations are exceeded but will proceed with the rating evaluation.

6) The longitudinal moment ratio, R_L, is based on the simple beam moment for the maximum span length. The positive moment is computed at the 0.4 and 0.5 point in the maximum span.

7) The longitudinal moment continuity correction factor, C, is computed for a two-span and three-span continuous bridge. For two-span bridges both spans are assumed equal to the maximum span. The positive moment is computed at the 0.4 point and the negative moment is computed at the middle support. For bridges having three or more spans, the "three-span" influence line configuration is used. The interior spans are assumed equal to the maximum span length and the exterior spans are calculated as the remainder based on the overall length and maximum span length of the bridge. The positive moment is computed at the 0.4 point of Span 1 or the exterior span and at the 0.5 point of Span 2 or the interior span. The negative moment is computed at the support. All supports are assumed to be on rollers and the cross-section of the bridge is uniform.

The longitudinal moment ratio and continuity factor are computed by "marching" the AASHTO and overload trucks over the computed influence lines for a one-span, two-span, or three-span configuration, as shown in Figures 1-1, 1-2, and 1-3, respectively. Each axle is placed at the lead position and marched at each 10th point on the spans to determine the maximum moment. For influence lines that are non-symmetrical, the truck is marched foward and backward. For H20 and HS20 type vehicles the lane loading is also considered in the evaluation.

1.4 Limitations

The following limitations are applicable to the program for the Level 1 evaluation and Special Level 2 analysis:

1) Only the State of Arizona has been considered for evaluation. Bridges that fall outside this state may use different rating procedures.

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2) Secondary members are ignored for rating which may lead to errors for "stringer/multi-beam or girder" type designs or other similar bridge types.

3) Hinges are ignored in the Special Level 2 evaluation. Only a limited number of slab plans have been incorporated into the program.

4) The shear mode for rating has been ignored.

5) Calculation of the transverse distribution ratio has not been incorporated into the program. Currently the user must input this value.

6) The end span calculation for continuous spans may be in error in the Level 1 evaluation if the maximum span length and overall length are coded incorrectly in the NBIF or the bridge has an unusual span configuration.

7) Columns are ignored in the Level 1 procedure and may introduce conservative results for the overload rating capacity.

8) A routing system has not been incorporated into the program. Currently the user is able to input a series of bridges on a specified route.

SIMPLE SPAN
INFLUENCE LINE FOR MOMENT

FIGURE 1-1. INFLUENCE LINE FOR A ONE-SPAN BRIDGE

6

TWO SPAN
INFLUENCE LINE FOR MOMENT

○ 0.4 POINT, SPAN 1 - POSITIVE MOMENT
▲ BENT - NEGATIVE MOMENT
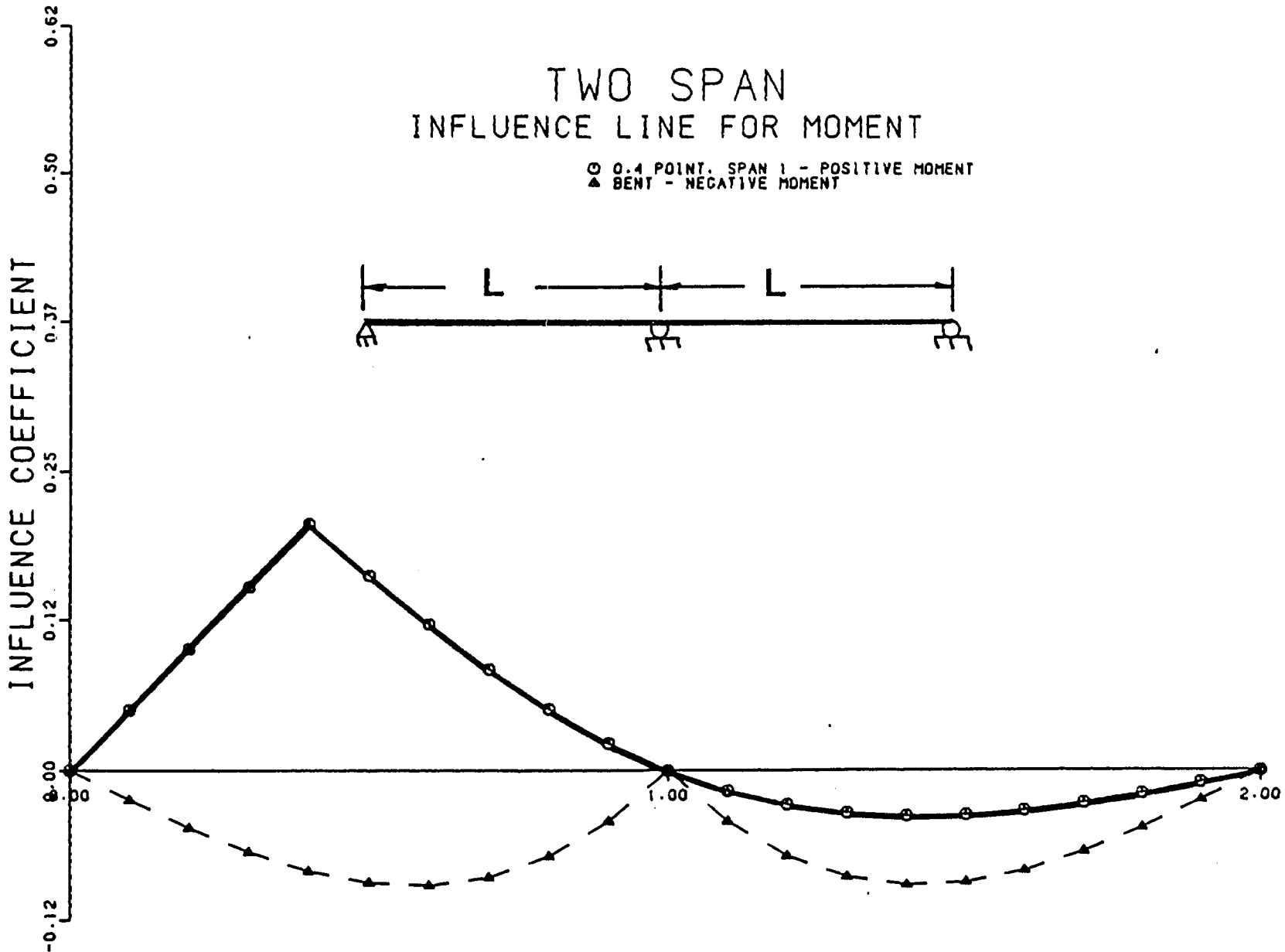
FIGURE 1-2. INFLUENCE LINE FOR A TWO-SPAN BRIDGE
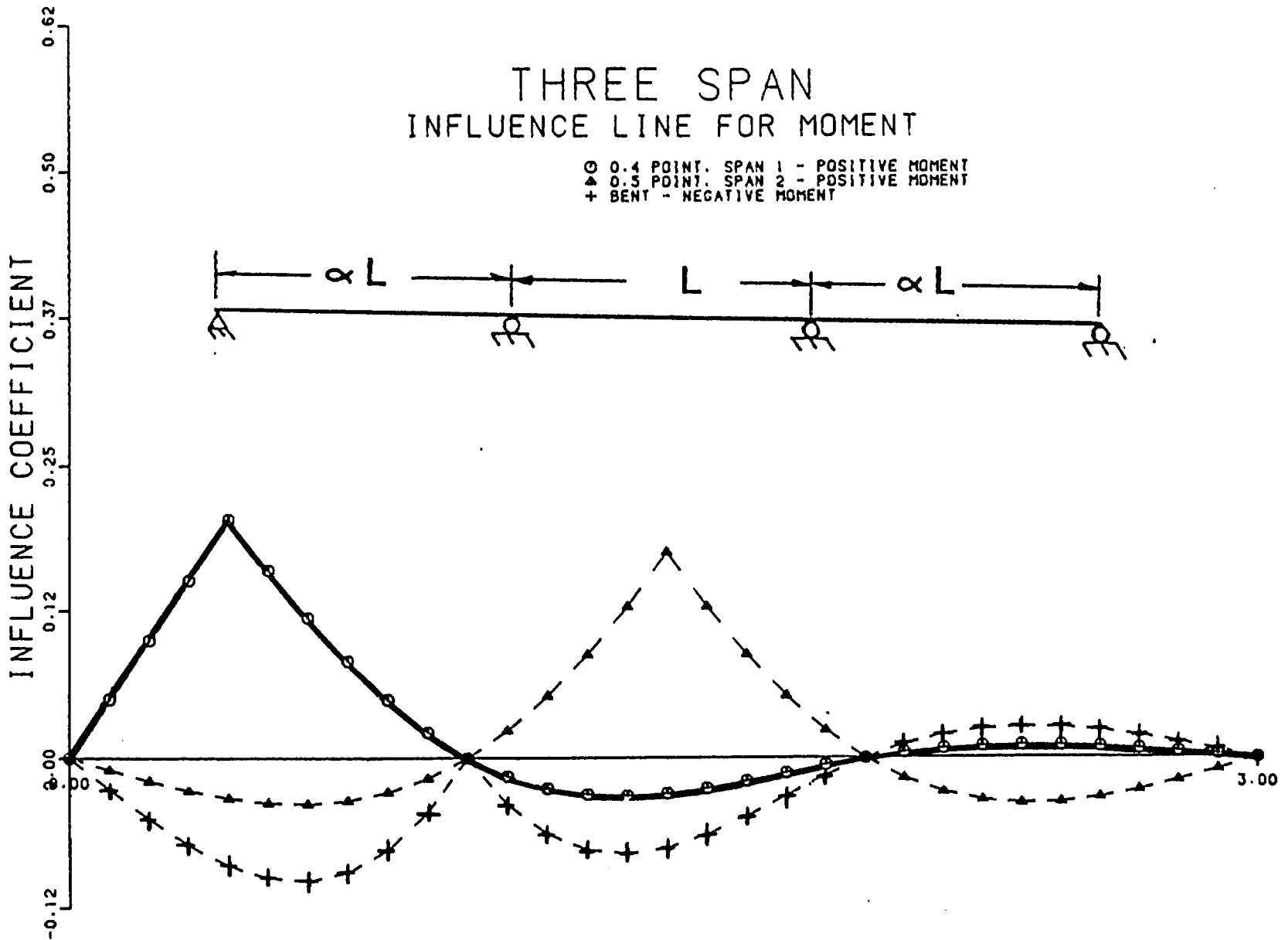
FIGURE 1-3. INFLUENCE LINE FOR A THREE-SPAN BRIDGE

2.0 PROGRAM OPERATION

2.1 CREATOR and MENU Programs

A windows option has been incorporated into the OVERLOAD system by utilizing a pair of programs, named CREATOR and MENU, developed at the University of Wyoming (4,5). The first program, CREATOR, is used to define the menu system by interactively defining the individual menu screens while the second program, MENU, is used to display the menus and develop the output for batch, data, and command language files. For this project the command language file is used as input to the OVERLOAD program.

The menus developed in CREATOR are arranged in a tree structure fashion from first screen to last screen where the data is input. Several screens are available that include these types: a menu screen for transferring control or branching, a tabular screen that has a spreadsheet format and is used to enter numeric data, a graphical screen to draw primitive shapes to define a drafted figure, a text screen to enter a one-line alphanumeric input field, and a help screen to describe the current screen. The tree structure and corresponding screen type and screen numbers developed for the OVERLOAD program are shown in Figure 2-1. OVERLOAD utilizes all screen types except the graphical screen. The actual screen created by MENU for the OVERLOAD program are shown in Figures 2-2 to 2-10. The number in the upper righthand corner of each screen corresponds to those screen numbers shown on the tree structure in Figure 2-1. The information entered into these screens for batch processing will be discussed in detail in Chapter 3.

2.1.1 File Assignment

Several files are used in the execution of the MENU program and they should be located in the same directory as MENU. These files are as follows:

MENUFILE.TXT   The menu storage file contains screen information which is accessed by MENU.

OVERPC.INV   The inventory file contains data input by the user
                  of MENU. It is defined and initialized in CREATOR,
                  but MENU writes input data into the file. The
                  inventory file may be accessed for addition, modi-
                  fication, selection, and deletion of records.

OVERPC.HLP   This file contains the data describing the help
                  screens.

OVERPC.ERR   The error code file contains error messages for
                  tabular or graphical screens.

OVERPC.DFT   The default value file is generated in MENU, but is
                  defined in CREATOR. This file contains default data
                  which is printed to the screen when an input type
                  screen is entered.

ADOT.RUN   A runtime file contains user input from MENU
                  which is submitted to the POST PROCESSOR to
                  generate batch files. The file is defined in MENU.

FILSTORE.TXT   This file is generated by CREATOR. The file must
                  reside in the default directory. The data files,
                  access codes, and programmed input paths are
                  stored in this file.

2.1.2 Program Execution

The program MENU, which is used as a windows option for the OVERLOAD
program, is executed from the IBM-AT computer terminal by typing the
DOS command MENU as follows:

c:\>MENU

The first executable screen is shown in Figure 2-11. The user should hit
the carriage return for the third command (PLEASE INPUT A DEFAULT
TITLE:) to give a blank default.

The transfer screens appear next, as shown in Figure 2-12. The remainder
of execution is accomplished by selecting the appropriate input screens
which are shown in Figures 2-2 to 2-10. The operation of these screens is

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described on the [F2] legend toggle. The last screen to appear is shown in Figure 2-13.

2.2 OVERLOAD Program

The OVERLOAD program computes the overload rating capacity by using a Level 1 procedure. Evaluation by this Level 1 procedure can be accomplished by supplying OVERLOAD with data that is grouped into data blocks.

The correct ordering of the input data blocks is shown in Figure 2-14. A solid triangle in the upper right-hand corner indicates a required data block for a single analysis.

The information in these data blocks will be explained in detail in Chapter 3.

2.2.1 File Assignment

Several files are used in the execution of the OVERLOAD program. These are assigned to various units as follows:

File 5 - Input file to the scan interpretor.
File 6 - Scan Echo file
File 7 - Output file which contains the calculated overload rating capacities.
File 8 - Reduced NBIF direct access file named ARIZONA.DIR.
File 9 - Input file created in the MENU program and named ADOT.POL.

2.2.2 Format of Reduced NBIF

The original NBIF with 90 data fields was reduced to 26 data fields that were accessed in the OVERLOAD program. The items included in the reduced NBIF are as follows:

ITEM NUMBER	ITEM NAME
08	STRUCTURE NO.
05	INVENTORY ROUTE
07	FACILITY CARRIED BY STRUCTURE
09	LOCATION
11	MILEPOINT
27	YEAR BUILT/RECONSTRUCTION
29	AVERAGE DAILY TRAFFIC
30	YEAR OF AVERAGE DAILY TRAFFIC
32	APPROACH ROADWAY WIDTH (FT)
34	SKEW (DEGREES)
41	OPEN(A),POSTED(P),CLOSED(C)
43	STRUCTURE TYPE, MAIN
44	STRUCTURE TYPE, APPROACH SPANS
45	NO. OF SPANS IN MAIN UNIT
46	NO. OF APPROACH SPANS
48	LENGTH OF MAXIMUM SPAN (FT)
49	STRUCTURE LENGTH (FT)
51	BRIDGE WIDTH,CURB-TO-CURB (FT)
53	MINIMUM VERTICAL CLEARANCE
57	WEARING SURFACE
58	DECK CONDITION
59	SUPERSTRUCTURE CONDITION
60	SUBSTRUCTURE CONDITION
64	OPERATING RATING
66	INVENTORY RATING
67	STRUCTURAL CONDITION

In addition to reducing the original NBIF, the undercrossings were eliminated. The final file is a direct access file containing 126 byte records.

2.2.3 Program Execution

The program OVERLOAD is executed from the IBM-AT computer terminal by typing the DOS command OVERLOAD as follows:

c:\>OVERLOAD

The screen will then prompt the user for the input file created by MENU or a file created by the user, as shown in Figure 2.15. If the user chooses to select the MENU file, it must be modified to correspond to the POL commands in OVERLOAD. This is accomplished internally in OVERLOAD by reading File 9 called ADOT.POL and modifying it to File 5 called OVER.DAT.

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Otherwise, if the user chooses to select a POL file that was created specifically for OVERLOAD, than File 5 will be read directly.

POL COMMANDS

SECONDARY MENUS   OVERLOAD (text) - 12

Overload Data Block - 2

                         OUTPUT LEVEL (tabular)-14
                                     (help)
                         STRUCTURE NUMBER (tab.)-16

                         GIRDER SPACING (tab.)-18

Structure
Data Block - 4   OPERATING RATING (tab.)-20

                         SLAB PLANS (tab.)-22
                                     (help)
                         CONTINUITY (tab.)-23
                                     (help)

MAIN MENU   TRUCK STANDARD (tab.)-24
                                          (help)
OVERLOAD WINDOWS - 1   TRUCK INDIVIDUAL (tab.)-26

                         TRUCK GROUP (tab.)-28

Truck Data Block -6
                         OUTER WHEEL SPACING (tab.)-30

                         INNER WHEEL SPACING (tab.)-32

                         VEHICLE WIDTH (tab.)-34

Impact Data Block-8 IMPACT (tab.)-36

Transverse Distribu- TRANSVERSE DISTRIBUTION
tion Data Block-10 , RATIO (tab.)-38

FIGURE 2-1. TREE STRUCTURE AND CORRESPONDING SCREEN NUMBERS

14

```
                    OVERLOAD WINDOWS                    1

 (F2) Legend Toggle      ADOT Overload Bridge Rating


         ════════════════════════════════════════

                  Overload Data Block

              ---) Structure Data Block

                  Track Data Block

                  Impact Data Block

                  Transverse Distribution Data Block
         ════════════════════════════════════════
```

```
                                                       2

 (F2) Legend Toggle        OVERLOAD DATA BLOCK


         ════════════════════════════════════════
              ---) Exit to Main Menu

                  EDIT Overload

                  EDIT Output Level
         ════════════════════════════════════════
```

```
                                                       4

 (F2) Legend Toggle   .    STRUCTURE DATA BLOCK


         ════════════════════════════════════════
              ---) Exit to Main Menu

                  EDIT Structure Number

                  EDIT Girder Spacing

                  EDIT Operating Rating

                  EDIT Slab Plans

                  EDIT Continuity
         ════════════════════════════════════════
```

FIGURE 2-2. MENU SCREENS 1, 2, AND 4

15
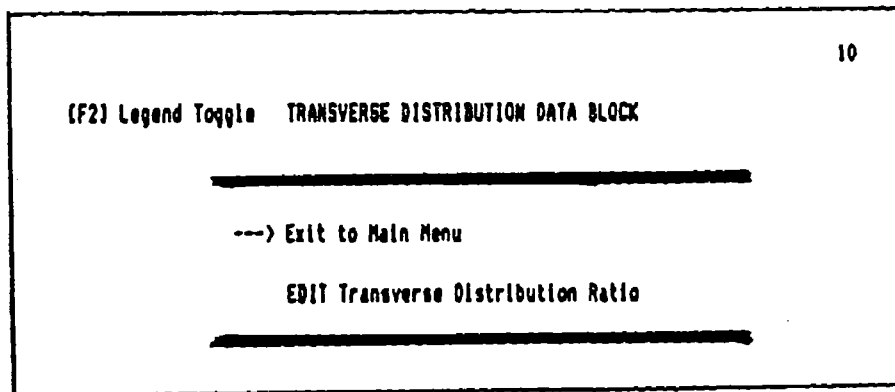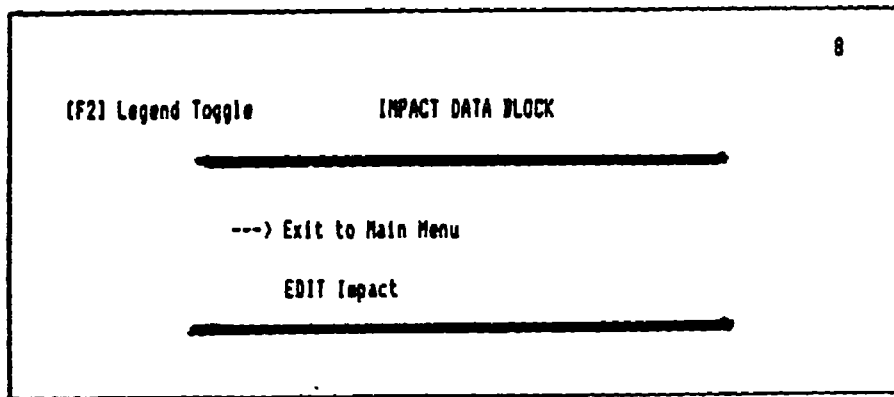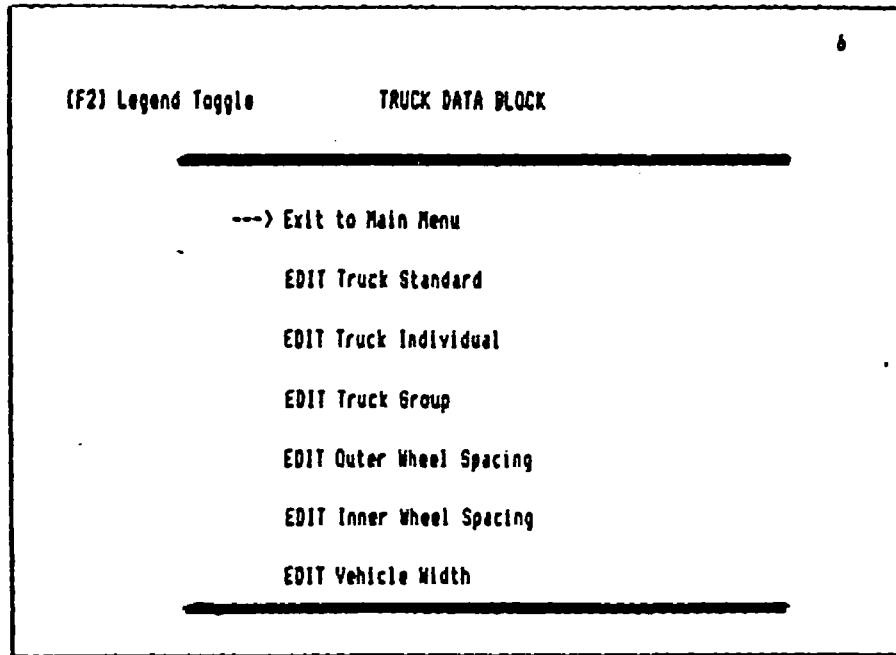
FIGURE 2-3. MENU SCREENS 6, 8 AND 10

16

```
                                                               12

(F2) Legend Toggle              OVERLOAD




              ENTER OPTIONAL TITLE :


              ENTER RESPONSE --->
```

```
                                                               14

(F2) Legend Toggle              OUTPUT LEVEL

                        +-----------------+--------+
                        |                 |  -1-   |
                        +-----------------+--------+
                        | Output Level    |        |
                        +-----------------+--------+
```

FIGURE 2-4. TEXT AND TABULAR SCREENS 12 AND 14

(F2) Legend Toggle   STRUCTURE NUMBER

	-1-	-2-	-3-	-4-	-5-
Structure Number					
Structure Number					
Structure Number					
Structure Number					
Structure Number					

18

(F2) Legend Toggle   GIRDER SPACING

.	-1-	-2-	-3-	-4-	-5-
Girder Spacing (ft)					
Girder Spacing (ft)					
Girder Spacing (ft)					
Girder Spacing (ft)					
Girder Spacing (ft)					

FIGURE 2-5. TABULAR SCREENS 16 AND 18

[F2] Legend Toggle   OPERATING RATING

	-1-	-2-	-3-	-4-	-5-
Operating Rating					
Operating Rating					
Operating Rating					
Operating Rating					
Operating Rating					

[F2] Legend Toggle   SLAB PLANS

	-1-	-2-	-3-	-4-	-5-
Slab Plans					
Slab Plans					
Slab Plans					
Slab Plans					
Slab Plans					

FIGURE 2-6. TABULAR SCREENS 20 AND 22

Screen 23:

(F2) Legend Toggle   CONTINUITY

	-1-	-2-	-3-	-4-	-5-
Continuity					
Continuity					
Continuity					
Continuity					
Continuity					

Screen 24:

(F2) Legend Toggle   TRUCK STANDARD

	-1-
Vehicle Code	

FIGURE 2-7. TABULAR SCREENS 23 AND 24

26

(F2) Legend Toggle   TRUCK INDIVIDUAL

	-1-	-2-	-3-	-4-	-5-
Axle Load (kips)					
Axle Spacing (ft)					
Axle Load (kips)					
Axle Spacing (ft)					
Axle Load (kips)					
Axle Spacing (ft)					

28

(F2) Legend Toggle   TRUCK GROUP

	-1-	-2-	-3-	-4-	-5-
Axle Load (kips)					
No. Axles per Group					
Axle Sp. in Group (ft)					
Sp. to Next Group (ft)					

FIGURE 2-8. TABULAR SCREENS 26 AND 28

21

```
                                                              30

[F2] Legend Toggle          OUTER WHEEL SPACING
```

.	-1-	-2-	-3-	-4-	-5-
Outer Wheel Spacing (ft)					
Outer Wheel Spacing (ft)					
Outer Wheel Spacing (ft)					
Outer Wheel Spacing (ft)					
Outer Wheel Spacing (ft)					
Outer Wheel Spacing (ft)					

```
                                                              32

[F2] Legend Toggle          INNER WHEEL SPACING
```

.	-1-	-2-	-3-	-4-	-5-
Inner Wheel Spacing (ft)					
Inner Wheel Spacing (ft)					
Inner Wheel Spacing (ft)					
Inner Wheel Spacing (ft)					
Inner Wheel Spacing (ft)					
Inner Wheel Spacing (ft)					

FIGURE 2-9. TABULAR SCREENS 30 AND 32

[F2] Legend Toggle   VEHICLE WIDTH

	-1-
Vehicle Width (ft)	

34

[F2] Legend Toggle   IMPACT

	-1-	-2-	-3-	-4-	-5-
Impact					
Impact					
Impact					
Impact					
Impact					

36

[F2] Legend Toggle   TRAN DIST RATIO

	-1-	-2-	-3-	-4-	-5-
Ratio					
Ratio					
Ratio					
Ratio					
Ratio					

38

FIGURE 2-10. TABULAR SCREENS 34, 36 AND 38

23

```
ARE YOU CREATING A NEW RUN FILE (Y or N) --->? Y

PLEASE INPUT YOUR INITIALS FOR IDENTIFICATION --->RAS

PLEASE INPUT A DEFAULT TITLE --->

ENTER THE INVENTORY FILE ACCESS CODE --->AAAA

ENTER THE DEFAULT FILE ACCESS CODE --->AAAA




                              ENTER (/?) THEN <CR> FOR HELP
```

FIGURE 2-11. FIRST EXECUTABLE SCREEN IN MENU

24

```
[F2] Legend Toggle


        ━━━━━━━━━━━━━━━━━━━━━━━━━━

        ---)  TRANSFER TO A SYSTEM MENU SCREEN

              MANUALLY RUN MENU SYSTEM

        ━━━━━━━━━━━━━━━━━━━━━━━━━━
```

```
[F2] Legend Toggle    MENU SCREENS IN MENU NETWORK          SCREEN NUMBER


              ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

        ---) OVERLOAD WINDOWS       ADOT Overload Bridge     1

                                    OVERLOAD DATA BLOCK      2

                                    STRUCTURE DATA BLOCK     4

                                    TRUCK DATA BLOCK         6

                                    IMPACT DATA BLOCK        8

                                    TRANSVERSE DISTRIBUT    10
              ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━
```

FIGURE 2-12. TRANSFER SCREENS IN MENU
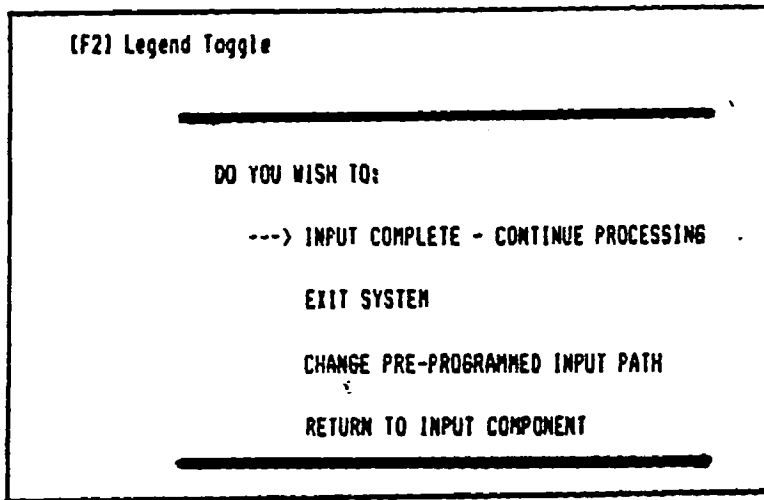
```
┌─────────────────────────────────────────────┐
│ (F2) Legend Toggle                           │        Explanation:
│                                              │
│        ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ ╲        │
│                                              │
│     DO YOU WISH TO:                          │     (writes data files
│                                              │      and returns to DOS)
│       ---) INPUT COMPLETE - CONTINUE PROCESSING  .
│                                              │     (returns to DOS)
│           EXIT SYSTEM                        │
│                                              │     (returns to transfer
│           CHANGE PRE-PROGRAMMED INPUT PATH   │      screen)
│                                              │
│           RETURN TO INPUT COMPONENT          │     (returns to Screen
│        ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━         │      1)
└─────────────────────────────────────────────┘
```

FIGURE 2-13. LAST EXECUTABLE SCREEN IN MENU

OVERLOAD recognizes the following input data blocks:

```
            ┌──────────────────────┐
            │      OVERLOAD      ◥ │
            └──────────┬───────────┘
                       │
                       │
      ┌────────────────┴────────────────────┐
      │            STRUCTURE              ◥ │
      └────────────────┬────────────────────┘
                       │
                       │
            ┌──────────┴───────────┐
            │        TRUCK      ◥ │
            └──────────┬───────────┘
                       │
                       │
            ┌──────────┴───────────┐
            │        IMPACT        │
            └──────────┬───────────┘
                       │
                       │
      ┌────────────────┴────────────────────┐
      │     TRANSVERSE DISTRIBUTION          │
      └────────────────┬────────────────────┘
                       │
                       ▼
                   ANALYSIS
```
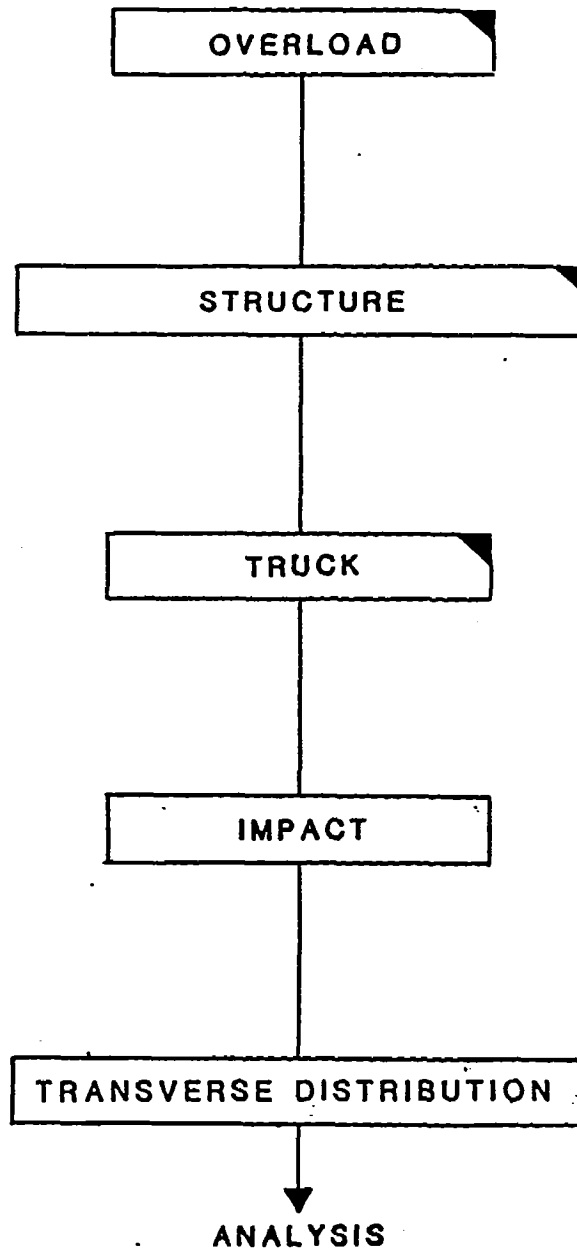
FIGURE 2-14. PROPER ORDER OF DATA BLOCKS

27

```
ADOT OVERLOAD BRIDGE RATING (VERSION 1.3)

Do you want to read in the MENU file?
(Enter YES or NO)YES

Scan Echo Name :CON
Output File Name:EXAM1.OUT

OVERLOAD NOW EXECUTING

        OVERLOAD  'EXAMPLE PROBLEM 1: CALIFORNIA P13 VEHICLE'
        OUTPUT LEVEL    1
        STRUCTURE NUMBER    461
        TRUCK STANDARD    11
        VEHICLE WIDTH    12
        FINISH

Stop - Program terminated.
```

FIGURE 2-15. OVERLOAD PROGRAM EXECUTION

3.0 OVERLOAD DATA ENTRY USING THE SCAN INTERPRETOR

3.1 Windows Option

The OVERLOAD program may access the POL file created by the MENU program. The MENU program is explained in detail in Chapter 2.

3.2 Scan Commands and Numeric Input

3.2.1 Commands

The input commands within a data block consist of words and numbers that identify data to the program. When a command consists of more than one word, the words must be supplied in the order shown. The commands within a data block may be ordered arbitrarily; the very few exceptions to this are noted.

A command word may be abbreviated. The complete command word is shown as upper case letters with the abbreviation underlined.

3.2.2 Numerical Input

1. General

A numeric field must be separated from other entries on the command line using the delimiters described below and cannot contain blanks.

2. Integers

Integers are signed (+/-) or unsigned whole numbers without a decimal point and without an exponential multiplier. Blanks are not permitted between the sign and first digit. Examples of integers are 125, -34, +238.

3. Real Numbers

Real numbers are signed (+/-) or unsigned numbers containing an optional decimal point (.) and optional exponential multiplier. The exponential multiplier consists of the upper case letter 'E' followed by a signed (+/-) or unsigned integer. If the exponential multiplier is used, a decimal point must be present in the numeric field preceding it. Blanks are not permitted anywhere within a real numeric field. Examples of reals are 3.2, -1., +4.52E4, -1.E-4.

4. Alphanumeric Titles

Each alphanumeric title must be enclosed within a pair of quotation marks (") or apostrophes ('). There cannot be quotation marks, apostrophes or semicolons within the title itself.

5. Conventions Used in Input Commands

SYMBOL	MEANING
xx	Single integer numeric field input
xx ...	Multiple input of integer numeric fields
xx.x	Single real numeric field input
xx.x ...	Multiple input of real numeric fields
'aaaaaaaa'	Alphanumeric title, eight or fewer characters in length, enclosed in either quotes or apostrophes.

6. Special Characters

a. Delimiters

Blanks and commas (,) are the only valid delimiters.

b. Separators

The minus (-) comprises the set of separators.

(1) Continuation

The minus (-) is used as a continuation symbol for command lines exceeding the maximum length of eighty characters. Continuations may not break up a command word or a numeric field.

Correct use of the continuation:

TRUCK INDIVIDUAL 12.94 17.75 22.68 4.33 22.68 -
        16. 29.13 6.

Incorrect use of the continuation:

TRUCK INDIVIDUAL 12.94 17.75 22.68 4.33 22. -
  68 16. 29.13 6.

(2) Comments

The upper case letter 'C' entered in column one followed by a blank in column two will make the data line a comment line.

3.3 Data Block Input

3.3.1 Overload Data Block

The OVERLOAD data block must be the first data block input for any analysis.

A. Summary of Commands

  *OVERLOAD "bbb...bbb"   (1)**

<div align="center">Entry Definition</div>

  *OUTPUT LEVEL xx 1: ALL   (2)
           2: ECHO
           3: RESULTS

B. OVERLOAD Data Example

1. OVERLOAD "ESB TRUCKING COMPANY-SALT LAKE CITY"
   OUTPUT 1

2. OVERLOAD "JAKES CRANE AND RIGGING-LAS VEGAS"
   OUTPUT 3

NOTES:

(1) An optional title may be specified on the same input line. This title is denoted by "bbb...bbb" and is up to 64 alphanumeric characters in length, must be enclosed in either apostrophes or quotes, and may not contain apostrophes, quotes or semicolons within the title.

(2) Levels of output are specified with the OUTPUT command: An entry of 1 generates a scan echo, data check, NBIF, and Level 1 analysis; 2 generates a scan echo, data check, and NBIF; and 3 generates a scan echo, data check, and Level 1 analysis.

*   Required input
** Refers to notes

3.3.2 Structure Data Block

The STRUCTURE data block consists of commands to define the bridge to be rated.

A. Summary of Commands

*STRUCTURE NUMBER xx ...	(1)
GIRDER SPACING xx.x ...	(2)
OPERATING RATING xx ...	(3)

Entry   Definition

SLAB PLANS xx ...

Entry	Definition	
0:	LEVEL 1 Evaluation	
1:	CS-2-15	
2:	CS-2-20	
3:	CS-3-20	(4)
4:	CS-4-20	
5:	CS-5-20I	
6:	CS-20	
7:	CS-20I	

CONTINUITY xx ...

Entry	Definition	
0:	NBIF Default	(5)
1:	Simple	
2:	Continuous	

B. STRUCTURE Data Examples

    1. Rating of bridges on Route 93 (all structures are non-girder type bridges, structure 413 is a slab bridge)

        STRUCTURE NUMBER 388 846 413
        OPERATING RATING 0 0 240
        SLAB PLANS 3

    2. Rating of bridges on Route I-10 (Structures 390 and 463 are slab bridges and structures 881 and 1085 are P/S I-girder bridges)

        STRUCTURE NUMBER 1725 1723 881 1085 390 463
        GIRDER SPACING 8.0 9.0 8.0 5.58 0.0 0.0
        OPERATING RATING 256 256 0 0 0 0
        SLAB PLANS 1 5
        CONTINUITY 0 0 2 2 0 0

    * Required input

NOTES:

(1) STRUCTURE NUMBER must be the first line of information in the STRUCTURE data block. The value of the integer corresponds to that bridge number which is located in the Arizona National Bridge Inventory File (NBIF). The integer range is from 1 to 9861. The NBIF for Arizona contains 2292 bridges and 2885 culverts. A maximum of 40 structures may be entered for an analysis.

(2) GIRDER SPACING is an optional command. The default value is 0. It must be specified for those bridges which have girder type systems; i.e. steel stringers, reinforced concrete T-beams, prestressed and reinforced concrete boxes, etc. Those bridges which do not have a girder type system should be given a value of 0.0. The units of the girder spacing must be in feet.

(3) OPERATING RATING is an optional command. The default is the NBIF value. It must be specified to overwrite the NBIF value. The coding should conform to the ratings given in Item 64 of the NBIF. Those ratings that are satisfactory in the NBIF should be given a value of 0.

(4) SLAB PLANS is an optional command. The default is a Level 1 evaluation. For those continuous slab bridges that were designed with standard plans the coded entry should be specified. A Special Level 2 evaluation will be performed. Those slab bridges that use a Level 1 evaluation should be given a value of 0.

(5) CONTINUITY is an optional command. The default is the NBIF specification. Bridges that are coded as simply supported (i.e. prestressed concrete I-girder bridges) even though they are actually continuous for live load, need an entry of 2. Similarly, an erroneous coded entry in item 43 of the NBIF for a simply supported bridge would require an entry of 1. Those bridges that are assumed coded correctly in the NBIF should be given a value of 0.

3.3.3 Truck Data Block

The TRUCK data block consists of a series of commands to define the overload truck configuration of axle loads, longitudinal axle spacings, outer and inner transverse wheel spacings, and the vehicle width.

Individual axle loads and spacings, standard vehicles, or group axle configurations may be used in the TRUCK data block. The units for this data block must be in kips and feet.

A. Summary of Commands

	Entry	Definition
	1:	H20
	2:	HS20
	3:	ALTERNATE MILITARY
	4:	TYPE 3
STANDARD xx	5:	TYPE 3S2
	6:	TYPE 33
	7:	P5
*TRUCK	8:	P7	(1)
	9:	P9
	10:	P11
	11:	P13

INDIVIDUAL xx.x ...

GROUP (xx.x xx xx.x xx.x) ...

*OUTER WHEEL SPACING xx.x ...   (2)

INNER WHEEL SPACING xx.x ...   (3)

*VEHICLE WIDTH xx.x   (4)

* Required Input

B. TRUCK Data Examples

Overload Vehicle 1 (GVW = 233.76 kips)

Lead Axle

12.94^k 45.36^k 58.26^k 58.40^k 58.80^k

|—17.75'—| |—4.33' |—16'—|6'|—— 36'——|6'|—14'—|6'|—

|———————————— 106.08' ————————————|

|—6'—|

|—— 10' ——|
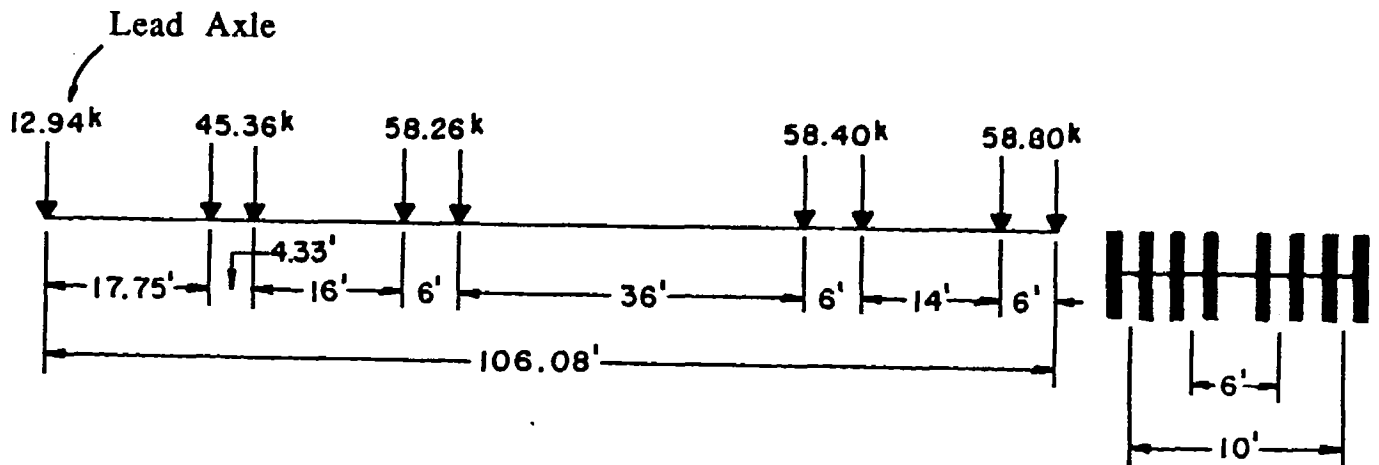
Overload Vehicle 2 (GVW = 293 kips)

15^k 46^k 58^k 58^k 58^k 58^k

|—16.5'—|4.5'|—14'—|4.5'|—14'—|4.5'|— 20'—|4.5'|—14'—|4.5'|—

|—————————————— 101' ——————————————|

|—6'—|

35
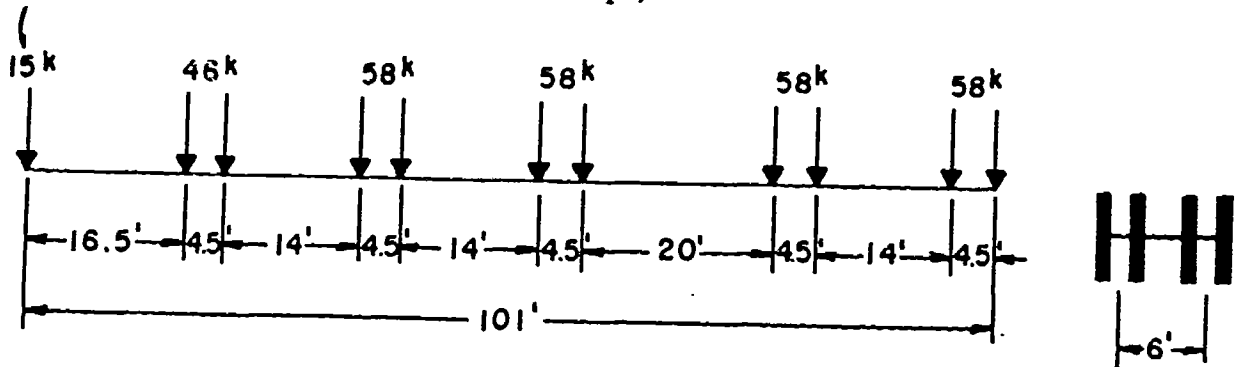
1. Standard Vehicle Type 3S2

   TRUCK STANDARD 5
   VEHICLE WIDTH 12.

2. Individual Axle Input for Overload Vehicle 1

   TRUCK INDIVIDUAL 12.94 17.75 22.68 4.33 22.68 16. -
         29.13 6. 29.13 36. 29.2 6. -
         29.2 14. 29.4 6. 29.4
   OUTER WHEEL SPACING 10. 10. 10. 10. 10. 10. 10. 10. 10.
   INNER WHEEL SPACING 6. 6. 6. 6. 6. 6. 6. 6. 6.
   VEHICLE WIDTH 12.

3. Group Axle Input for Overload Vehicle 2

   TRUCK GROUP 15. 1 0. 16.5 -
           23. 2 4.5 14. -
           29. 2 4.5 14. -
           29. 2 4.5 14. -
           29. 2 4.5 20. -
           29. 2 4.5 14. -
           29. 2 4.5
   OUTER WHEEL SPACING 6. 6. 6. 6. 6. 6.
   VEHICLE WIDTH 12.
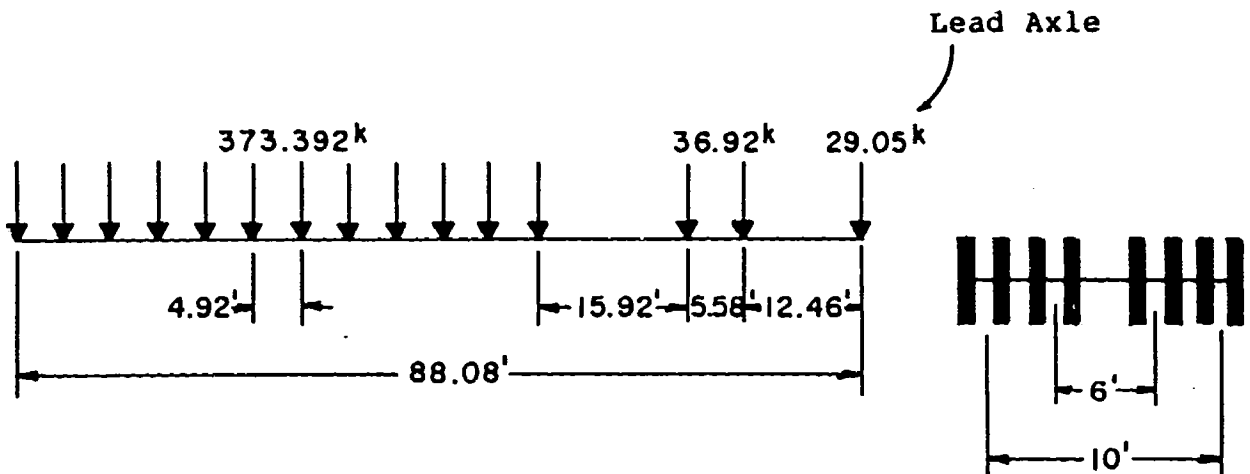
4. Group Axle Input

```
TRUCK GROUP 29.05 1 0. 12.46 -
            18.46 2 5.58 15.92 -
            31.116 12 4.92
OUTER WHEEL CONFIGURATION 10. 10. 10.
INNER WHEEL CONFIGURATION 6. 6. 6.
VEHICLE WIDTH 12.
```

NOTES:

(1) Standard vehicles have been implemented into the program for ease of input. These vehicle configurations are AASHTO design and legal vehicles and California P-series overloads. When the TRUCK STANDARD command is used, the outer and inner wheel spacing commands are not required.

Individual axle loads and spacings, using the TRUCK INDIVIDUAL command, or group axle configurations, using the TRUCK GROUP command, may be used. A group is defined as axles which have identical loads, longitudinal spacings, and transverse wheel spacings. The units are in kips and feet. When the TRUCK INDIVIDUAL or TRUCK GROUP command is used, the outer wheel spacing is required. A maximum of 30 axle loads may be entered for an analysis.

(2) Outer wheel spacings are specified in feet. The number of spacings should be equal to the number of indivdual axles or group axles entered previously.

(3) Inner wheel spacings are specified in feet. The number of spacings should be equal to the number of individual axles or group axles entered previously.

(4) The vehicle width is specified in feet. This value will be checked with the approach roadway width (Item 32) and the bridge width, curb-to-curb (Item 51) in the NBIF.

3.3.4 Impact Data Block

The impact of the overload vehicle is specified in the IMPACT data block.

A. Summary of Commands

IMPACT xx.x ...   (1)

B. IMPACT Data Example

IMPACT 0.01 0.01 0.01 0.01 0.01 (assume no impact)

NOTES:

(1) IMPACT is an optional command. The value must correspond to those bridges entered in the STRUCTURE block. If IMPACT is omitted, the value will default to the AASHTO formula. Those impacts which are to have AASHTO values should be given a value of 0.0.

3.3.5 Transverse Distribution Data Block

The TRANSVERSE DISTRIBUTION data block specifies the ratio of the overload distribution to the rating vehicle distribution.

A. Summary of Commands

TRANSVERSE DISTRIBUTION RATIO xx.x ...   (1)

B. TRANSVERSE DISTRIBUTION Data Example

TRA DIS RATIO 1.0 0.90 1.0 0.85 0.97
FINISH

NOTES:

(1) TRANSVERSE DISTRIBUTION is an optional command. The default is 1.0 which indicates an overload distribution equal to the rating vehicle distribution.

(2) The value of RATIO must correspond to those bridges entered in the STRUCTURE block. A ratio less than 1.0 indicates a better distribution for the overload vehicle than the rating vehicle.

* Required Input

The OVERLOAD commands and example number illustrating the use of the scan commands are as follows:

	Example Problem			
	1	2	3	4
WINDOWS OPTION:	X			
OVERLOAD COMMANDS:				
OVERLOAD	X	X	X	X
OUTPUT LEVEL 1	X	X		X
OUTPUT LEVEL 3			X	
STRUCTURE NUMBER	X	X	X	X
GIRDER SPACING		X	X	
OPERATING RATING		X	X	X
SLAB PLANS	X	X	X	X
CONTINUITY		X	X	X
TRUCK STANDARD	X			
TRUCK INDIVIDUAL				X
TRUCK GROUP		X	X	
OUTER WHEEL SPACING		X	X	X
INNER WHEEL SPACING				
VEHICLE WIDTH	X	X	X	X
IMPACT			X	
TRANSVERSE DIST. RATIO	X	X	X	X

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4.1 Example Problem 1 - California P13 Vehicle with Windows Option

[F2] Legend Toggle   OVERLOAD

ENTER OPTIONAL TITLE :

ENTER RESPONSE --->EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

[F2] Legend Toggle   OUTPUT LEVEL

	-1-
Output Level	1

[F2] Legend Toggle   STRUCTURE NUMBER

	-1-	-2-	-3-	-4-	-5-
Structure Number	461				
Structure Number					
Structure Number					
Structure Number					
Structure Number					

22

(F2) Legend Toggle   SLAB PLANS

.	-1-	-2-	-3-	-4-	-5-
Slab Plans	5				
Slab Plans					
Slab Plans					
Slab Plans					
Slab Plans					

24

(F2) Legend Toggle   TRUCK STANDARD

	-1-
Vehicle Code	11

34

(F2) Legend Toggle   VEHICLE WIDTH

	-1-
Vehicle Width (ft)	12

OVERLOAD; ;EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD;;

OUTPUT LEVEL; ; 1;;

STRUCTURE NUMBER; ; 461;;

SLAB PLANS; ; 5;;

TRUCK STANDARD; ; 11;;

VEHICLE WIDTH; ; 12;;

ADOT OVERLOAD BRIDGE RATING (VERSION 1.3)

Do you want to read in the MENU file?
(Enter YES or NO)YES

Scan Echo Name :CON
Output File Name:EXAMPLE1.OUT

OVERLOAD NOW EXECUTING

     OVERLOAD "EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD"
     OUTPUT LEVEL   1
     STRUCTURE NUMBER   461
     SLAB PLANS   5
     TRUCK STANDARD   11
     VEHICLE WIDTH   12
     FINISH

Stop - Program terminated.

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

****
                    OVERLOAD SCAN ECHO
****

OVERLOAD   EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD"
OUTPUT LEVEL   1
STRUCTURE NUMBER   461
SLAB PLANS   5
TRUCK STANDARD   11
VEHICLE WIDTH   12
FINISH

****** OVERLOAD *******   :VERSION 1.1)
ADOT OVERLOAD BRIDGE RATING   BY INSSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

****
                    OVERLOAD DATA CHECK
****

*************** STRUCTURE DATA ***************

    STRUCTURE   GIRDER   OPERATING   CONTINUITY
     NUMBER   SPACING   RATING   (0- NBIF DEFAULT)
                  (FT.   (0- NBIF   (1-SIMPLE)
                           DEFAULT)   (2-CONTINUOUS)

      461   .00   0   0

```
******* OVERLOAD *******          (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING        BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

*****************************************************************
                     OVERLOAD DATA CHECK
*****************************************************************


*************** SLAB PLAN DATA ****************

        SLAB        SLAB        SLAB
      SEQUENCE      PLAN        PLAN      TYPE OF
       NUMBER       CODE       ACTUAL     ANALYSIS

          1           5       CS-S-20 I   SPECIAL LEVEL 2

NOTE: SPECIAL LEVEL 2 DOES NOT CONSIDER A
      SLAB WITH HINGES
```

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

****
                        OVERLOAD DATA CHECK
****

*************** TRUCK DATA ******************
    STANDARD VEHICLE: P13

AXLE LOAD ID	AXLE LOAD (KIPS)	AXLE LAYOUT (FT)	WHEEL SPACING OUTER (FT)	WHEEL SPACING INNER (FT)	AXLE GROUP ID
1	26.00	.00	6.00	.00	1
2	48.00	18.00	6.00	.00	2
3	48.00	36.00	6.00	.00	3
4	48.00	54.00	6.00	.00	4
5	48.00	72.00	6.00	.00	5
6	48.00	90.00	6.00	.00	6
7	48.00	108.00	6.00	.00	7

         VEHICLE WIDTH   12.00 (FT)

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

**********************************************************************
                     OVERLOAD DATA CHECK
**********************************************************************


*************** IMPACT DATA ****************

    STRUCTURE      IMPACT
     NUMBER        FACTOR

       461          .00 *


ASTERISK (*) INDICATES DEFAULTS TO AASHTO IMPACT FORMULA
```

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

****
                      OVERLOAD DATA CHECK
****

******** TRANSVERSE DISTRIBUTION DATA ********

        STRUCTURE   RATIO
         NUMBER

           461   1.00

```
****** OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING      B. IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

************************************************************************
                 NATIONAL BRIDGE INVENTORY FILE
************************************************************************


************** STATE OF ARIZONA **************

   ITEM    ITEM
  NUMBER   NAME

    08     STRUCTURE NO. ..................... 461
    05     INVENTORY ROUTE ..................111000404
    07     FACILITY CARRIED BY STRUCTURE.....I 40: WB
    09     LOCATION .........................10.3 MI WEST OF JCT US191
    11     MILEPOINT ........................323.08
    27     YEAR BUILT/RECONSTRUCTION ........5676
    29     AVERAGE DAILY TRAFFIC ............ 4400
    30     YEAR OF AVERAGE DAILY TRAFFIC ....83
    32     APPROACH ROADWAY WIDTH (FT) ...... 38
    34     SKEW (DEGREES) ...................30
    41     OPEN(A),POSTED(P),CLOSED(C) ......A
    43     STRUCTURE TYPE, MAIN .............201
    44     STRUCTURE TYPE, APPROACH SPANS ...  0
    45     NO. OF SPANS IN MAIN UNIT ........  5
    46     NO. OF APPROACH SPANS ............  0
    48     LENGTH OF MAXIMUM SPAN (FT) ......  30
    49     STRUCTURE LENGTH (FT) ............  142
    51     BRIDGE WIDTH,CURB-TO-CURB (FT) ... 42.0
    53     MINIMUM VERTICAL CLEARANCE .......9999
    57     WEARING SURFACE ..................2
    58     DECK CONDITION ...................8
    59     SUPERSTRUCTURE CONDITION .........8
    60     SUBSTRUCTURE CONDITION ...........8
    64     OPERATING RATING .................244
    66     INVENTORY RATING .................229
    67     STRUCTURAL CONDITION .............8
```

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 1: CALIFORNIA P13 OVERLOAD

****
                            RESULTS
****

*********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.   461   YR BLT/RECON 56/75
    INVENTORY RT.   111000404   NO.SPANS,MAIN   5
    FAC. CARRIED   I 40: WB   NO.SPANS,APP   0
    LOCATION   10.3   LEN. MAX SPAN   30
    MILEPOINT   323.08   STRUCTURE LEN   142

    STRUCTURE TYPE :   REIN CONC SLAB (CONTIN)

******** OVERLOAD VEHICLE INFORMATION ********

                L.L. MOMENT   AASHTO   AASHTO LOAD
                 PER LANE   IMPACT   DISTRIBUTION
                  (K-FT)   (LANES)

    EXT SPAN   243.73   1.30   .0914
    INT SPAN   208.07   1.30   .0862
    BENT   -257.52   1.30   .0887

********** SPECIAL LEVEL 2 ANALYSIS **********
            (HINGES NOT CONSIDERED)

    EXTERIOR TO INTERIOR SPAN RATIO   .817

                MOMENT - DEAD   L.L.MOMENT   IMPACT   TRAN.
                CAPACITY LOAD   PLUS IMP.   RATIO   RATIO   OVLDRR

    EXT SPAN   34.56   28.96   1.00   1.00   1.19
    INT SPAN   35.46   23.32   1.00   1.00   1.52
    BENT   40.39   -29.70   1.00   1.00   1.36

    CONTROLLING OVLDRR =   1.19 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****

4.2 Example Problem 2 - Overload Vehicle Mixed with Traffic (Truck Group)

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                    OVERLOAD SCAN ECHO
****


```
C
C              ---EXAMPLE PROBLEM 2---
C         OVERLOAD VEHICLE MIXED WITH TRAFFIC
C
OVERLOAD    "EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY"
OUTPUT LEVEL 1
C
C ---STRUCTURE DATA BLOCK---
C
STRUC NUMBER  1725 1727 881 1085 390 -  # SLAB BRIDGES: 390 AND 463
              463
C
GIRDER SPACING  6.   7.  5.  5.58   0  -    # TO BE ADDED LATER TO
                     0                      # LEVEL 1 EVALUATION
C
C
OPERATING RATING 256  256   0   0   0  -    # RF OVERWRITE
                      0
C
SLAB PLANS  2  4                        # SPECIAL LEVEL 2
C
CONTINUITY  0  0  2  2  0  0    # P/S I-GIRDER: 881 AND 1085
C
C ---TRUCK DATA BLOCK---
C
C
C                                          # 9 AXLES (GVW=234 KIPS)
C
TRUCK GROUP          12.94    1    0.     17.75  -
                     22.68    2    4.33   16.00  -
                     29.13    2    6.00   36.00  -
                     29.20    2    6.00   14.00  -
                     29.40    2    6.00
C
OUTER WHEEL SPACING  8.  8.  8.  8.  8.  # TO BE ADDED LATER
C                                          TO LEVEL 1 EVALUATION
VEHICLE WIDTH 12.
C
C ---IMPACT DATA BLOCK---
C     (NOT REQUIRED FOR AASHTO DEFAULT)
C
C ---TRANSVERSE DISTRIBUTION DATA BLOCK---
C
C                                          # ASSUME OVERLOAD AND HS20
TRA DIS RAT 0.75  0.75  0.90  0.90 0.97  -
            0.97
C
FINISH
```

****** OVERLOAD *******   (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                    OVERLOAD DATA CHECK
****

*************** STRUCTURE DATA ***************

STRUCTURE NUMBER	GIRDER SPACING (FT)	OPERATING RATING (0- NBIF DEFAULT)	CONTINUITY (0- NBIF DEFAULT) (1-SIMPLE) (2-CONTINUOUS)
1725	8.00	256	0
1723	9.00	256	0
861	8.00	0	2
1085	5.58	0	2
390	.00	0	0
463	.00	0	0

******* OVERLOAD *******   VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                     OVERLOAD DATA CHECK
****

*************** SLAB PLAN DATA ***************

SLAB SEQUENCE NUMBER	SLAB PLAN CODE	SLAB PLAN ACTUAL	TYPE OF ANALYSIS
1	2	CS-2-20	SPECIAL LEVEL 2
2	4	CS-4-20	SPECIAL LEVEL 2

NOTE: SPECIAL LEVEL 2 DOES NOT CONSIDER A
      SLAB WITH HINGES

```
****** OVERLOAD *******         (VERSION 1.5)
ADOT OVERLOAD BRIDGE RATING     BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

***************************************************************
                    OVERLOAD DATA CHECK
***************************************************************


**************** TRUCK DATA ****************

 AXLE       AXLE      AXLE     WHEEL SPACING     AXLE
 LOAD       LOAD     LAYOUT    OUTER    INNER    GROUP
  ID       (KIPS)     (FT)     (FT)     (FT)      ID

   1        12.94      .00     5.00      .00       1
   2        22.68    17.75     8.00      .00       2
   3        22.68    22.08     8.00      .00       2
   4        29.13    38.08     8.00      .00       3
   5        29.13    44.08     8.00      .00       3
   6        29.20    80.08     8.00      .00       4
   7        29.20    86.08     8.00      .00       4
   8        29.40   100.08     8.00      .00       5
   9        29.40   106.08     8.00      .00       5

         VEHICLE WIDTH          12.00 (FT)
```

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY LARSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                         OVERLOAD DATA CHECK
****

**************** IMPACT DATA ******************

STRUCTURE   IMPACT
 NUMBER   FACTOR

   1725   .00 *
   1733   .00 *
    581   .00 *
   1035   .00 *
    390   .00 *
    461   .00 *

ASTERISK (*) INDICATES DEFAULTS TO AASHTO IMPACT FORMULA

******* OVERLOAD *******   VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                        OVERLOAD DATA CHECK
****

******** TRANSVERSE DISTRIBUTION DATA ********

STRUCTURE NUMBER	RATIO
1725	.75
1727	.75
881	.90
1085	.90
390	.97
463	.97

******* OVERLOAD *******   VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

******* OVERLOAD *******   (VERSION 1.3)
ACCT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                NATIONAL BRIDGE INVENTORY FILE
****

**************** STATE OF ARIZONA ***************

```
   ITEM      ITEM
 NUMBER      NAME

   08        STRUCTURE NO. ..................... 1725
   05        INVENTORY ROUTE ...................134000852
   07        FACILITY CARRIED BY STRUCTURE.....SS 85; RAMP B
   09        LOCATION .........................JCT SS 95
   11        MILEPOINT .........................154.41
   27        YEAR BUILT/RECONSTRUCTION ........7600
   29        AVERAGE DAILY TRAFFIC ............  1000
   30        YEAR OF AVERAGE DAILY TRAFFIC ....85
   32        APPROACH ROADWAY WIDTH (FT) ......  22
   34        SKEW (DEGREES) ...................22
   41        OPEN(A),POSTED(P),CLOSED(C) ......A
   43        STRUCTURE TYPE, MAIN .............606
   44        STRUCTURE TYPE, APPROACH SPANS ...  0
   45        NO. OF SPANS IN MAIN UNIT ........  2
   46        NO. OF APPROACH SPANS ............  0
   48        LENGTH OF MAXIMUM SPAN (FT) ...... 140
   49        STRUCTURE LENGTH (FT) ............  274
   51        BRIDGE WIDTH,CURB-TO-CURB (FT) ... 26.0
   53        MINIMUM VERTICAL CLEARANCE .......9999
   57        WEARING SURFACE ..................1
   58        DECK CONDITION ...................8
   59        SUPERSTRUCTURE CONDITION .........8
   60        SUBSTRUCTURE CONDITION ...........8
   64        OPERATING RATING .................236
   66        INVENTORY RATING .................236
   67        STRUCTURAL CONDITION .............8
```

******* OVERLOAD ********   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                         RESULTS
****

********** NBIF GENERAL INFORMATION **********

   STRUCTURE NO.   1725   YR BLT/RECON   76/ 0
   INVENTORY AT.   104000853   NO.SPANS,MAIN   1
   FWD. CARRIED   SS 85; RAMP B   NO.SPANS,APP   0
   LOCATION   JCT SS 85   LEN. MAX SPAN   170
   MILEPOINT   154.41   STRUCTURE LEN   174

   STRUCTURE TYPE : P/S CONC BOX-S (CONTIN -NBIF DEFAULT)

********** RATING VEHICLE INFORMATION ********
              HS20 TRUCK

   OPERATING WEIGHT   (TONS)   =   56.00
   WT. RATING VEHICLE   (TONS)   =   36.00
   RF: OPERATING   (NBIF OVERWRITE) =   1.56

           LIVE LOAD MOMENT PER LANE (K-FT) AASHTO
   SPAN   EXT   INT   BENT IMPACT

   SIMPLE   NA   2240.00   NA   1.19
   TWO   NA   1823.70   -2040.50 1.19

******** OVERLOAD VEHICLE INFORMATION ********

           LIVE LOAD MOMENT PER LANE (K-FT)
   SPAN   EXT   INT   BENT IMPACT

   SIMPLE   NA   4522.79   NA   1.19 (AASHTO DEFAULT)
   TWO   NA   3611.88   -2394.65 1.19 (AASHTO DEFAULT)

************** LEVEL 1 ANALYSIS **************
                                          SPAN RATIO 1.000
          MOMENT   IMPACT TRAN.
          RATIO CONTIN RATIO   RATIO OVLORR

     INT   2.02   .98   1.00   .75   1.05
     BENT 2.02   .58   1.00   .75   1.77

   CONTROLLING OVLORR =   1.05 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                NATIONAL BRIDGE INVENTORY FILE
****

*************** STATE OF ARIZONA ***************

    ITEM   ITEM
  NUMBER   NAME

    06   STRUCTURE NO. 1723
    05   INVENTORY ROUTE 111009102
    07   FACILITY CARRIED BY STRUCTURE.....I 10; EB
    09   LOCATION ....19.5 M W JCT I10 I17
    11   MILEPOINT 129.67
    27   YEAR BUILT/RECONSTRUCTION 7800
    29   AVERAGE DAILY TRAFFIC 5500
    30   YEAR OF AVERAGE DAILY TRAFFIC 83
    32   APPROACH ROADWAY WIDTH (FT) 38
    34   SKEW (DEGREES) 0
    41   OPEN(A),POSTED(P),CLOSED(C) ......A
    43   STRUCTURE TYPE, MAIN 506
    44   STRUCTURE TYPE, APPROACH SPANS ... 0
    45   NO. OF SPANS IN MAIN UNIT 1
    46   NO. OF APPROACH SPANS 0
    48   LENGTH OF MAXIMUM SPAN (FT) 160
    49   STRUCTURE LENGTH (FT) 163
    51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 42.3
    53   MINIMUM VERTICAL CLEARANCE 9999
    57   WEARING SURFACE 1
    58   DECK CONDITION 8
    59   SUPERSTRUCTURE CONDITION 8
    60   SUBSTRUCTURE CONDITION 8
    64   OPERATING RATING 236
    66   INVENTORY RATING 236
    67   STRUCTURAL CONDITION 8

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                              RESULTS
****

*********** NBIF GENERAL INFORMATION **********

     STRUCTURE NO.   1733   YR BLT/RECON 72/ 0
     INVENTORY RT.   111000103   NO.SPANS,MAIN   1
     FAC. CARRIED   I 10: EB   NO.SPANS,APP   0
     LOCATION   19.5 M W JCT I10 I17   LEN. MAX SPAN   160
     MILEPOIN   129.67   STRUCTURE LEN   160

     STRUCTURE TYPE : P/S CONC BOX-S (SIMPLE -NBIF DEFAULT)

********** RATING VEHICLE INFORMATION ********
                 AS20 TRUCK

     OPERATING WEIGHT   (TONS)   =   36.00
     WT. RATING VEHICLE   (TONS)   =   36.00
     RF: OPERATING   (NBIF OVERWRITE) =   1.56

            LIVE LOAD MOMENT PER LANE (K-FT) AASHTO
     SPAN   EXT   INT   BENT IMPACT

     SIMPLE   NA   2768.00   NA   1.13

******** OVERLOAD VEHICLE INFORMATION ********

            LIVE LOAD MOMENT PER LANE (K-FT)
     SPAN   EXT   INT   BENT IMPACT

     SIMPLE   NA   5644.84   NA   1.13 (AASHTO DEFAULT)

************** LEVEL 1 ANALYSIS **************
                                            SPAN RATIO   .000
            MOMENT   IMPACT TRAN.
            RATIO CONTIN RATIO   RATIO OVLDRR

     SIMPLE 2.04   1.00   1.00   .75   1.02

     CONTROLLING OVLDRR =   1.02 (NOTE- POSITIVE MOMENT CONTROLS)

          ***** THIS BRIDGE IS A GO *****

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMESER AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                    NATIONAL BRIDGE INVENTORY FILE
****

************** STATE OF ARIZONA **************

    ITEM   ITEM
   NUMBER   NAME

    08   STRUCTURE NO. 981
    05   INVENTORY ROUTE 111000102
    07   FACILITY CARRIED BY STRUCTURE.....I 10:EB
    09   LOCATION ....5.3 MI WEST JCT SR 360
    11   MILEPOINT 149.62
    27   YEAR BUILT/RECONSTRUCTION 6400
    29   AVERAGE DAILY TRAFFIC 53000
    30   YEAR OF AVERAGE DAILY TRAFFIC 83
    32   APPROACH ROADWAY WIDTH (FT) 52
    34   SKEW (DEGREES) 14
    41   OPEN(A),POSTED(P),CLOSED(C) ......A
    43   STRUCTURE TYPE, MAIN 502
    44   STRUCTURE TYPE, APPROACH SPANS ... 0
    45   NO. OF SPANS IN MAIN UNIT 4
    46   NO. OF APPROACH SPANS 0
    48   LENGTH OF MAXIMUM SPAN (FT) 52
    49   STRUCTURE LENGTH (FT) 160
    51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 52.0
    53   MINIMUM VERTICAL CLEARANCE 9999
    57   WEARING SURFACE 1
    58   DECK CONDITION 8
    59   SUPERSTRUCTURE CONDITION 7
    60   SUBSTRUCTURE CONDITION 8
    64   OPERATING RATING 269
    66   INVENTORY RATING 248
    67   STRUCTURAL CONDITION 8

```
******* OVERLOAD *******           (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING        BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

************************************************************************
                               RESULTS
************************************************************************

********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.                    881      YR BLT/RECON  64/ 0
    INVENTORY RT.               111000102     NO.SPANS,MAIN     3
    FAC. CARRIED        I 10:EB              NO.SPANS,APP       0
    LOCATION     5.3 MI WEST JCT SR 360     LEN. MAX SPAN     52
    MILEPOINT                      149.62    STRUCTURE LEN    150

    STRUCTURE TYPE : P/S CONC  STRG  (CONTIN -NBIF OVERWRITE)

********** RATING VEHICLE INFORMATION ********
              HS20 TRUCK

    OPERATING WEIGHT        (TONS)   =       59.00
    WT. RATING VEHICLE      (TONS)   =       36.00
    RF: OPERATING   (NBIF DEFAULT)   =        1.72

              LIVE LOAD MOMENT PER LANE (K-FT)  AASHTO
    SPAN           EXT          INT         BENT  IMPACT

    SIMPLE          NA       656.00          NA    1.29
    THREE        215.03      368.21      -315.71   1.28

******** OVERLOAD VEHICLE INFORMATION ********

              LIVE LOAD MOMENT PER LANE (K-FT)
    SPAN           EXT          INT         BENT  IMPACT

    SIMPLE          NA       959.70          NA    1.29 (AASHTO DEFAULT)
    THREE        278.04      510.93      -495.83   1.29 (AASHTO DEFAULT)

*************** LEVEL 1 ANALYSIS ***************
                                          SPAN RATIO   .518

        MOMENT         IMPACT  TRAN.
        RATIO CONTIN   RATIO   RATIO OVLDRR

    EXT  1.46    .88   1.00    .90   1.65
    INT  1.46    .95   1.00    .90   1.53
    BENT 1.46   1.07   1.00    .90   1.36

    CONTROLLING OVLDRR =      1.36 (NOTE- NEGATIVE MOMENT CONTROLS)

         ***** THIS BRIDGE IS A GO *****
```

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

+++
              NATIONAL BRIDGE INVENTORY FILE
+++

************** STATE OF ARIZONA **************

     ITEM   ITEM
     NUMBER   NAME

     08   STRUCTURE NO. 1035
     05   INVENTORY ROUTE 111000102
     07   FACILITY CARRIED BY STRUCTURE.....I 10; EB
     09   LOCATION ....126.0 MI N OF JCT I-8
     11   MILEPOINT 173.12
     27   YEAR BUILT/RECONSTRUCTION 6430
     29   AVERAGE DAILY TRAFFIC 9500
     30   YEAR OF AVERAGE DAILY TRAFFIC 83
     32   APPROACH ROADWAY WIDTH (FT) 38
     34   SKEW (DEGREES) 30
     41   OPEN(A),POSTED(P),CLOSED(C) ......A
     43   STRUCTURE TYPE, MAIN 502
     44   STRUCTURE TYPE, APPROACH SPANS ... 0
     45   NO. OF SPANS IN MAIN UNIT 17
     46   NO. OF APPROACH SPANS   0
     48   LENGTH OF MAXIMUM SPAN (FT) 79
     49   STRUCTURE LENGTH (FT) 1337
     51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 30.0
     53   MINIMUM VERTICAL CLEARANCE 9999
     57   WEARING SURFACE 1
     58   DECK CONDITION 7
     59   SUPERSTRUCTURE CONDITION 8
     60   SUBSTRUCTURE CONDITION 8
     64   OPERATING RATING 251
     66   INVENTORY RATING 245
     67   STRUCTURAL CONDITION 7

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

*******************************************************************
                          RESULTS
*******************************************************************


********** NBIF GENERAL INFORMATION **********

   STRUCTURE NO.                     1085      YR BLT/RECON  64/ 0
   INVENTORY RT.              11000102         NO.SPANS,MAIN    17
   FAC. CARRIED        I 10: EB               NO.SPANS,APP       7
   LOCATION      25.0 MI N OF JCT I-8          LEN. MAX SPAN    79
   MILEPOINT                       173.12      STRUCTURE LEN  1337

   STRUCTURE TYPE : P/S CONC  STRG   (CONTIN -NBIF OVERWRITE)


********** RATING VEHICLE INFORMATION ********
              HS20 TRUCK

   OPERATING WEIGHT        (TONS)   =        51.00
   WT. RATING VEHICLE      (TONS)   =        36.00
   RF: OPERATING   (NBIF DEFAULT)   =         1.42

           LIVE LOAD MOMENT PER LANE (K-FT)  AASHTO
   SPAN          EXT           INT        BENT IMPACT

   SIMPLE         NA        1142.00          NA  1.25
   THREE       870.15        740.17      -702.80  1.25


******** OVERLOAD VEHICLE INFORMATION ********

           LIVE LOAD MOMENT PER LANE (K-FT)
   SPAN          EXT           INT        BENT IMPACT

   SIMPLE         NA        1730.10          NA  1.25 (AASHTO DEFAULT
   THREE      1311.65        887.98     -1451.75  1.25 (AASHTO DEFAULT)


************** LEVEL 1 ANALYSIS **************
                                           SPAN RATIO   .962
           MOMENT     IMPACT  TRAN.
           RATIO CONTIN  RATIO  RATIO OVLDRR

      EXT   1.51    .99   1.00    .90   1.04
      INT   1.51    .79   1.00    .90   1.31
      BENT  1.51   1.36   1.00    .90    .76

   CONTROLLING OVLDRR =       .76 (NOTE- NEGATIVE MOMENT CONTROLS)

       ***** LEVEL 2 ANALYSIS REQUIRED *****
```

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                 NATIONAL BRIDGE INVENTORY FILE
****

*************** STATE OF ARIZONA ***************

```
 ITEM     ITEM
NUMBER    NAME

  08      STRUCTURE NO. ....................     390
  05      INVENTORY ROUTE .................111000104
  07      FACILITY CARRIED BY STRUCTURE.....I 10; WB
  09      LOCATION .........................10.9 MI NORTH JCT I 19
  11      MILEPOINT .......................249.49
  27      YEAR BUILT/RECONSTRUCTION ........5390
  29      AVERAGE DAILY TRAFFIC ............ 16000
  30      YEAR OF AVERAGE DAILY TRAFFIC ....83
  32      APPROACH ROADWAY WIDTH (FT) ...... 38
  34      SKEW (DEGREES) ................... 0
  41      OPEN(A),POSTED(P),CLOSED(C) ......A
  43      STRUCTURE TYPE, MAIN .............201
  44      STRUCTURE TYPE, APPROACH SPANS ... 0
  45      NO. OF SPANS IN MAIN UNIT ........ 11
  46      NO. OF APPROACH SPANS ............ 0
  48      LENGTH OF MAXIMUM SPAN (FT) ...... 32
  49      STRUCTURE LENGTH (FT) ............ 343
  51      BRIDGE WIDTH,CURB-TO-CURB (FT) ... 42.0
  53      MINIMUM VERTICAL CLEARANCE .......9999
  57      WEARING SURFACE ..................1
  58      DECK CONDITION ...................8
  59      SUPERSTRUCTURE CONDITION .........8
  60      SUBSTRUCTURE CONDITION ...........8
  64      OPERATING RATING .................233
  66      INVENTORY RATING .................220
  67      STRUCTURAL CONDITION .............8
```

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                              RESULTS
****

********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.   390   YR BLT/RECON 55/80
    INVENTORY RT.   111000104   NO. SPANS,MAIN   11
    FAC. CARRIED   I 10; WB   NO. SPANS,APP   0
    LOCATION   10.9   LEN. MAX SPAN   32
    MILEPOINT   249.49   STRUCTURE LEN   343

    STRUCTURE TYPE :   REIN CONC SLAB   (CONTIN)

******** OVERLOAD VEHICLE INFORMATION ********

              L.L. MOMENT   AASHTO   AASHTO LOAD
               PER LANE   IMPACT   DISTRIBUTION
                (K-FT)   (LANES)

    EXT SPAN   244.49   1.30   .0898
    INT SPAN   236.96   1.30   .0845
    BENT   -282.40   1.30   .0871

********** SPECIAL LEVEL 2 ANALYSIS **********
            (HINGES NOT CONSIDERED)

    EXTERIOR TO INTERIOR SPAN RATIO   .816

              MOMENT - DEAD L.L.MOMENT   IMPACT   TRAN.
              CAPACITY LOAD PLUS IMP.   RATIO   RATIO   OVLDRR

    EXT SPAN   25.33   28.55   1.00   .97   .91
    INT SPAN   26.18   26.02   1.00   .97   1.04
    BENT   33.09   -31.76   1.00   .97   1.07

    CONTROLLING OVLDRR =   .91 (NOTE- POSITIVE MOMENT CONTROLS)

       ***** LEVEL 2 ANALYSIS REQUIRED *****

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE TRUCKING COMPANY

****
                    NATIONAL BRIDGE INVENTORY FILE
****

*************** STATE OF ARIZONA ***************

    ITEM   ITEM
   NUMBER   NAME

    08   STRUCTURE NO. 463
    05   INVENTORY ROUTE 111000102
    07   FACILITY CARRIED BY STRUCTURE.....I10;EB
    09   LOCATION ....17.1 MI E JCT I 19
    11   MILEPOINT 277.46
    27   YEAR BUILT/RECONSTRUCTION 5680
    29   AVERAGE DAILY TRAFFIC 7500
    30   YEAR OF AVERAGE DAILY TRAFFIC 82
    32   APPROACH ROADWAY WIDTH (FT) 36
    34   SKEW (DEGREES) 0
    41   OPEN(A),POSTED(P),CLOSED(C) ......A
    43   STRUCTURE TYPE, MAIN 201
    44   STRUCTURE TYPE, APPROACH SPANS ... 0
    45   NO. OF SPANS IN MAIN UNIT 4
    46   NO. OF APPROACH SPANS 0
    48   LENGTH OF MAXIMUM SPAN (FT) 25
    49   STRUCTURE LENGTH (FT) 74
    51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 35.9
    53   MINIMUM VERTICAL CLEARANCE 9999
    57   WEARING SURFACE 2
    58   DECK CONDITION 8
    59   SUPERSTRUCTURE CONDITION 8
    60   SUBSTRUCTURE CONDITION 8
    64   OPERATING RATING 233
    66   INVENTORY RATING 226
    67   STRUCTURAL CONDITION 8

```
******* OVERLOAD *******        (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING     BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 2: RELIABLE  ROOFING COMPANY

*********************************************************************
                            RESULTS
*********************************************************************



********** NBIP GENERAL INFORMATION **********

   STRUCTURE NO.                    4&3     YR BLT/RECON  56 50
   INVENTORY RT.               111000192    NO.SPANS,MAIN      4
   FAC. CARRIED        (10:EB              NO.SPANS,APP       0
   LOCATION                        17.1     LEN. MAX SPAN     25
   MILEPOINT                     277.46     STRUCTURE LEN     94

   STRUCTURE TYPE :   REIN CONC SLAB  (CONTIN)


******* OVERLOAD VEHICLE INFORMATION ********

           L.L. MOMENT      AASHTO      AASHTO LOAD
            PER LANE        IMPACT     DISTRIBUTION
             (K-FT)                        (LANES)

   EXT SPAN    187.27        1.30          .0956
   INT SPAN    147.88        1.30          .0909
   BENT       -218.96        1.30          .0932


********** SPECIAL LEVEL 2 ANALYSIS **********
           (HINGES NOT CONSIDERED )

   EXTERIOR TO INTERIOR SPAN RATIO    .920

           MOMENT - DEAD  L.L.MOMENT  IMPACT   TRAN.
           CAPACITY LOAD  PLUS IMP.   RATIO    RATIO   OVLDRR

   EXT SPAN    24.27        23.27      1.00     .97    1.08
   INT SPAN    24.89        17.48      1.00     .97    1.47
   BENT        30.69       -26.53      1.00     .97    1.19

   CONTROLLING OVLDRR =      1.08 (NOTE- POSITIVE MOMENT CONTROLS)

       ***** THIS BRIDGE IS A GO *****
```

4.3 Example Problem 3 - Single Overload Vehicle

******* OVERLOAD *******   (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****
                    OVERLOAD SCAN ECHO
****

```
C
C               ---EXAMPLE PROBLEM 3---
C SINGLE OVERLOAD VEHICLE (NO MIXTURE WITH TRAFFIC)
C
OVERLOAD   "EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY"
OUTPUT LEVEL  3                          $ NBIF OMITTED IN OUTPUT
C
C ---STRUCTURE DATA BLOCK---
C
STRUC NUMBER   1725 1723 881 1085 390 -  $ SLAB BRIDGES: 390 AND 463
               463
C
GIRDER SPACING  8.   9.  8. 5.58   0  -   $ TO BE ADDED LATER TO
                    0                      $ LEVEL 1 EVALUATION
C
C
OPERATING RATING 256  256   0   0   0  -  $ RF OVERWRITE
                     0
C
SLAB PLANS  2  4                          $ SPECIAL LEVEL 2
C
CONTINUITY  0   0   2   2   0   0   $ P/S I-GIRDER: 881 AND 1085
C
C ---TRUCK DATA BLOCK---
C
C                                        $ 9 AXLES  GVW=234 KIPS
C
TRUCK GROUP           12.94   1     0.    17.75  -
                      22.68   2    4.33   16.00  -
                      29.13   2    6.00   36.00  -
                      29.20   2    6.00   14.00  -
                      29.40   2    6.00
C
OUTER WHEEL SPACING  8.  8.  8.  8.  8.   $ TO BE ADDED LATER
C                                           TO LEVEL 1 EVALUATION
VEHICLE WIDTH 12.
C
C ---IMPACT DATA BLOCK---
C
IMPACT  0.01 0.01 0.01 0.01 0.01 0.01     $ ASSUME 5 MPH
C
C ---TRANSVERSE DISTRIBUTION DATA BLOCK---
C
C                                         $ ASSUME OVERLOAD ONLY
TRA DIS FAT 0.50  0.50  0.55  0.55 0.60  -
            0.60
C
FINISH
```

******* OVERLOAD *******   (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****
                    OVERLOAD DATA CHECK
****

*************** STRUCTURE DATA ***************

STRUCTURE NUMBER	GIRDER SPACING (FT)	OPERATING RATING (0- NBIF DEFAULT)	CONTINUITY (0- NBIF DEFAULT) (1-SIMPLE) (2-CONTINUOUS)
1725	8.00	256	0
1723	7.00	256	0
281	8.00	0	2
1085	5.58	0	2
390	.00	0	0
463	.00	0	0

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****
                      OVERLOAD DATA CHECK
****

*************** SLAB PLAN DATA ***************

SLAB SEQUENCE NUMBER	SLAB PLAN CODE	SLAB PLAN ACTUAL	TYPE OF ANALYSIS
1	2	CS-2-20	SPECIAL LEVEL 2
2	4	CS-4-20	SPECIAL LEVEL 2

NOTE: SPECIAL LEVEL 2 DOES NOT CONSIDER A
      SLAB WITH HINGES

******* OVERLOAD *******   (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

.***
                    OVERLOAD DATA CHECK
****

**************** TRUCK DATA *****************

AXLE LOAD ID	AXLE LOAD (KIPS)	AXLE LAYOUT (FT)	WHEEL SPACING OUTER (FT)	INNER (FT)	AXLE GROUP ID
1	12.94	.00	8.00	.00	1
2	22.68	17.75	8.00	.00	2
3	22.68	22.08	8.00	.00	2
4	29.10	32.08	8.00	.00	3
5	29.10	44.08	8.00	.00	3
6	29.20	80.08	8.00	.00	4
7	29.20	86.08	8.00	.00	4
8	29.40	100.08	8.00	.00	5
9	29.40	106.08	8.00	.00	5

         VEHICLE WIDTH   12.00 (FT)

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****
                    OVERLOAD DATA CHECK
****

***************** IMPACT DATA *****************

    STRUCTURE   IMPACT
      NUMBER   FACTOR

        1725   .01
        1723   .01
         661   .01
        1085   .01
         350   .01
         463   .01

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****
                        OVERLOAD DATA CHECK
****

******** TRANSVERSE DISTRIBUTION DATA ********

STRUCTURE NUMBER	RATIO
1725	.50
1723	.50
881	.55
1085	.55
390	.60
463	.60

```
******* OVERLOAD *******        (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING     BY IMBSEN AND ASSOCIATES, INC.
```

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

```
**************************************************************
                          RESULTS
**************************************************************
```

********** NBIF GENERAL INFORMATION **********

```
   STRUCTURE NO.                    1725    YR BLT/RECON   75/ 0
   INVENTORY RT.                 134000853  NO. SPANS,MAIN     2
   FAC. CARRIED        SS 85; RAMP B        NO. SPANS,APP      0
   LOCATION        JCT SS 85                LEN. MAX SPAN    140
   MILEPOINT                       154.41   STRUCTURE LEN    274
```

   STRUCTURE TYPE : P/S CONC BOX-S (CONTIN -NBIF DEFAULT)

********** RATING VEHICLE INFORMATION ********
                HS20 TRUCK

```
   OPERATING WEIGHT       (TONS)   =        56.00
   WT. RATING VEHICLE     (TONS)   =        36.00
   PF: OPERATING   (NBIF OVERWRITE) =        1.56
```

```
              LIVE LOAD MOMENT PER LANE (K-FT)   AASHTO
   SPAN           EXT          INT       BENT IMPACT

   SIMPLE         NA        2240.00         NA    1.19
   TWO            NA        1923.70    -2040.50   1.19
```

******** OVERLOAD VEHICLE INFORMATION ********

```
              LIVE LOAD MOMENT PER LANE (K-FT)
   SPAN           EXT          INT       BENT IMPACT

   SIMPLE         NA        4522.79         NA    1.01 (OVERWRITE)
   TWO            NA        3611.88    -2394.65   1.01 (OVERWRITE)
```

************** LEVEL 1 ANALYSIS **************
                                            SPAN RATIO 1.000
```
        MOMENT         IMPACT  TRAN.
        RATIO CONTIN   RATIO   RATIO OVLDRR

   INT  2.02    .98     .85     .50   1.85
   BENT 2.02    .56     .85     .50   3.12
```

   CONTROLLING OVLDRR =   1.85 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****
                          RESULTS
****

********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.   1723   YR BLT/RECON   78/
    INVENTORY RT.   111000102   NO. SPANS,MAIN   1
    FAC. CARRIED   I 10: EB   NO. SPANS,APP   0
    LOCATION   19.5 M W JCT I10 I17   LEN. MAX SPAN   160
    MILEPOINT   129.67   STRUCTURE LEN   160

    STRUCTURE TYPE : P/S CONC BOX-S (SIMPLE -NBIF DEFAULT)

********** RATING VEHICLE INFORMATION ********
              HS20 TRUCK

    OPERATING WEIGHT   (TONS)   =   56.00
    WT. RATING VEHICLE   (TONS)   =   36.00
    RF: OPERATING   (NBIF OVERWRITE) =   1.56

          LIVE LOAD MOMENT PER LANE (K-FT) AASHTO
    SPAN   EXT   INT   BENT IMPACT

    SIMPLE   NA   2768.00   NA   1.18

******** OVERLOAD VEHICLE INFORMATION ********

          LIVE LOAD MOMENT PER LANE (K-FT)
    SPAN   EXT   INT   BENT IMPACT

    SIMPLE   NA   5644.84   NA   1.01 (OVERWRITE)

************** LEVEL 1 ANALYSIS **************
                                         SPAN RATIO   .000
          MOMENT   IMPACT TRAN.
          RATIO CONTIN RATIO   RATIO OVLDRR

    SIMPLE   2.04   1.00   .86   .50   1.78

    CONTROLLING OVLDRR =   1.78 (NOTE- POSITIVE MOMENT CONTROLS)

          ***** THIS BRIDGE IS A GO *****

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

*****************************************************************
                            RESULTS
*****************************************************************

********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.                    E81      YR BLT/RECON  84/ 0
    INVENTORY RT.             111000102       NO.SPANS,MAIN     4
    FAC. CARRIED        I 10;EB              NO.SPANS,APP       0
    LOCATION      5.2 MI WEST JCT SR 360     LEN. MAX SPAN     52
    MILEPOINT                    149.62       STRUCTURE LEN    160

    STRUCTURE TYPE : P/S CONC  STRG   (CONTIN -NBIF OVERWRITE)

********** RATING VEHICLE INFORMATION ********
           HS20 TRUCK

    OPERATING WEIGHT         (TONS)    =       69.00
    WT. RATING VEHICLE       (TONS)    =       36.00
    RF: OPERATING    (NBIF DEFAULT)    =        1.92

            LIVE LOAD MOMENT PER LANE (K-FT)  AASHTO
    SPAN          EXT            INT         BENT IMPACT

    SIMPLE         NA         656.00           NA   1.28
    THREE       215.03        368.21       -315.71  1.28

******** OVERLOAD VEHICLE INFORMATION ********

            LIVE LOAD MOMENT PER LANE (K-FT)
    SPAN          EXT            INT         BENT IMPACT

    SIMPLE         NA         959.70           NA   1.01 (OVERWRITE)
    THREE       278.04        510.93       -495.83  1.01 (OVERWRITE)

*************** LEVEL 1 ANALYSIS ***************
                                            SPAN RATIO   .538
          MOMENT         IMPACT  TRAN.
          RATIO CONTIN   RATIO   RATIO OVLDRR

    EXT   1.46    .88     .79     .55   3.42
    INT   1.46    .95     .79     .55   3.19
    BENT  1.46   1.07     .79     .55   2.82

    CONTROLLING OVLDRR =     2.82 (NOTE- NEGATIVE MOMENT CONTROLS)

          ***** THIS BRIDGE IS A GO *****
```

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.
```

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

```
***********************************************************************
                              RESULTS
***********************************************************************
```

********** NBIF GENERAL INFORMATION **********

```
    STRUCTURE NO.                        1065      YR BLT/RECON  64/ 0
    INVENTORY RT.                    111000102     NO.SPANS,MAIN    17
    FAC. CARRIED        I 10: EB                   NO.SPANS,APP      0
    LOCATION       26.0 MI N OF JCT I-5            LEN. MAX SPAN    79
    MILEPOINT                          173.12      STRUCTURE LEN  1337
```

    STRUCTURE TYPE : P/S CONC STRG (CONTIN -NBIF OVERWRITE)

********** RATING VEHICLE INFORMATION ********
            HS20 TRUCK

```
    OPERATING WEIGHT        (TONS)   =      51.00
    WT. RATING VEHICLE      (TONS)   =      36.00
    RF: OPERATING   (NBIF DEFAULT)   =       1.42
```

	LIVE LOAD MOMENT PER LANE (K-FT)		AASHTO	
SPAN	EXT	INT	BENT	IMPACT
SIMPLE	NA	1142.00	NA	1.25
THREE	870.15	740.17	-702.80	1.25

******** OVERLOAD VEHICLE INFORMATION ********

	LIVE LOAD MOMENT PER LANE (K-FT)			
SPAN	EXT	INT	BENT	IMPACT
SIMPLE	NA	1730.10	NA	1.01 (OVERWRITE)
THREE	1311.65	887.98	-1451.75	1.01 (OVERWRITE)

*************** LEVEL 1 ANALYSIS ***************

SPAN RATIO .962

	MOMENT RATIO	CONTIN	IMPACT RATIO	TRAN. RATIO	OVLDRR
EXT	1.51	.99	.81	.55	2.11
INT	1.51	.79	.81	.55	2.65
BENT	1.51	1.36	.81	.55	1.54

CONTROLLING OVLDRR =   1.54 (NOTE- NEGATIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****

```
******* OVERLOAD *******            (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING         BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY

****************************************************************************
                              RESULTS
****************************************************************************
```

```
********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.                    390     YR BLT/RECON  53/90
    INVENTORY RT.              111000104     NO.SPANS,MAIN    11
    FAC. CARRIED        I 10; WE            NO.SPANS,APP      0
    LOCATION                        10.9     LEN. MAX SPAN    32
    MILEPOINT                     249.49     STRUCTURE LEN   343

    STRUCTURE TYPE :    REIN CONC SLAB  (CONTIN)
```

```
******** OVERLOAD VEHICLE INFORMATION ********

              L.L. MOMENT     AASHTO     AASHTO LOAD
                PER LANE      IMPACT     DISTRIBUTION
                 (K-FT)                    (LANES)

    EXT SPAN     244.49        1.30         .0898
    INT SPAN     236.96        1.30         .0845
    BENT        -252.40        1.30         .0871
```

```
********** SPECIAL LEVEL 2 ANALYSIS **********
         (HINGES NOT CONSIDERED )

    EXTERIOR TO INTERIOR SPAN RATIO    .816

          MOMENT - DEAD  L.L.MOMENT   IMPACT   TRAN.
          CAPACITY LOAD  PLUS IMP.    RATIO    RATIO   OVLDRR

    EXT SPAN    25.33      28.55       .78      .60     1.90
    INT SPAN    26.18      26.02       .78      .60     2.16
    BENT        33.09     -31.96       .78      .60     2.22

    CONTROLLING OVLDRR =     1.90 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****
```

```
******* OVERLOAD *******        (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING     BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 3: RELIABLE TRUCKING COMPANY


***********************************************************************
                              RESULTS
***********************************************************************



********** NBIP GENERAL INFORMATION **********

    STRUCTURE NO.                      463      YR BLT/RECON  56/60
    INVENTORY RT.                 11100010E     NO.SPANS,MAIN       4
    FAC. CARRIED        I10;EB                  NO.SPANS,APP        0
    LOCATION                          17.1      LEN. MAX SPAN      28
    MILEPOINT                       277.46      STRUCTURE LEN      94

    STRUCTURE TYPE :    REIN CONC SLAB   (CONTIN)


******** OVERLOAD VEHICLE INFORMATION ********

             L.L. MOMENT      AASHTO      AASHTO LOAD
              PER LANE        IMPACT      DISTRIBUTION
              (K-FT)                        (LANES)

    EXT SPAN     187.27        1.30           .0956
    INT SPAN     147.88        1.30           .0909
    BENT        -218.96        1.30           .0932


********** SPECIAL LEVEL 2 ANALYSIS **********
            (HINGES NOT CONSIDERED )

    EXTERIOR TO INTERIOR SPAN RATIO    .820

             MOMENT - DEAD  L.L.MOMENT   IMPACT   TRAN.
             CAPACITY LOAD  PLUS IMP.    RATIO    RATIO   OVLDRR

    EXT SPAN     24.27        23.27       .78      .60     2.24
    INT SPAN     24.89        17.48       .78      .60     3.06
    BENT         30.69       -26.53       .78      .60     2.48

    CONTROLLING OVLDRR =      2.24 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****
```

4.4 Example Problem 4 - Overload Vehicle Mixed with Traffic (Truck Individual)

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.


EXAMPLE PROBLEM 4: ANDERSON TRUCKING


****************************************************************
                    OVERLOAD SCAN ECHO
****************************************************************


C
C              ---EXAMPLE PROBLEM 4---
C        OVERLOAD VEHICLE MIXED WITH TRAFFIC
C
OVERLOAD    "EXAMPLE PROBLEM 4: ANDERSON TRUCKING"
OUTPUT LEVEL 1
C
C ---STRUCTURE DATA BLOCK---
C
C                                        * RATING ON ROUTE I-40
C
STRUC NUMBER    461  539 519 1596 845 753  * SLAB BRIDGES: 461
C                                          * P/S I-GIRDER: 519,1596
C GIRDER SPACING                           * TO BE ADDED LATER TO
C (DEFAULT IS 0.)                            LEVEL 1 EVALUATION
C
OPERATING RATING 244 241 233 245 269 251   * RF OVERWRITE
C
SLAB PLANS 5
C
CONTINUITY 0 0 2 2 0 0
C
C ---TRUCK DATA BLOCK---
C
C                                        * 6 AXLES (GVW=113 KIPS)
C
TRUCK INDIVIDUAL      9.770    13.50   23.345 4.33 23.345 29.0 -
                    18.997     4.17   18.997 4.17 18.997
C
C
OUTER WHEEL SPACING 8.  8.  8.  8.  8.  8. * TO BE ADDED LATER
C                                            TO LEVEL 1 EVALUATION
VEHICLE WIDTH 12.
C
C ---IMPACT DATA BLOCK---
C     (NOT REQUIRED FOR AASHTO DEFAULT)
C
C ---TRANSVERSE DISTRIBUTION DATA BLOCK---
C
C                                        * ASSUME OVERLOAD AND HS20
TRA DIS RAT 0.97  0.80  0.90  0.90 0.90  0.90
C
FINISH
```

******* OVERLOAD *******   (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                    OVERLOAD DATA CHECK
****

*************** STRUCTURE DATA ****************

STRUCTURE NUMBER	GIRDER SPACING (FT.	OPERATING RATING (0- NBIF DEFAULT)	CONTINUITY (0- NBIF DEFAULT) (1-SIMPLE) (2-CONTINUOUS)
461	.00	244	0
539	.00	241	0
519	.00	233	2
1576	.00	245	2
645	.00	269	0
758	.00	251	0

******* OVERLOAD *******   (VERSION 1.0)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

******* OVERLOAD *******   (VERSION 1.3)
FDOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                      OVERLOAD DATA CHECK
****

************** SLAB PLAN DATA ***************

| SLAB | SLAB | SLAB | |
| SEQUENCE | PLAN | PLAN | TYPE OF |
NUMBER	CODE	ACTUAL	ANALYSIS
1	S	02-5-20 I	SPECIAL LEVEL 2

NOTE: SPECIAL LEVEL 2 DOES NOT CONSIDER A.
      SLAB WITH HINGES

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
OVERLOAD DATA CHECK
****

**************** TRUCK DATA *****************

AXLE LOAD ID	AXLE LOAD (KIPS)	AXLE LAYOUT (FT)	WHEEL SPACING OUTER (FT)	WHEEL SPACING INNER (FT)	AXLE GROUP ID
1	9.77	.00	6.00	.00	1
2	23.34	13.50	6.00	.00	2
3	23.34	17.83	6.00	.00	3
4	19.00	46.83	6.00	.00	4
5	19.00	51.00	6.00	.00	5
6	19.00	55.17	6.00	.00	6

VEHICLE WIDTH   12.00 (FT)

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                        OVERLOAD DATA CHECK
****

***************** IMPACT DATA *******************

     STRUCTURE   IMPACT
       NUMBER   FACTOR

  .   451   .00 *
         509   .00 *
         517   .00 *
        1596   .00 *
         545   .00 *
         758   .00 *

ASTERISK (*) INDICATES DEFAULTS TO AASHTO IMPACT FORMULA

******* OVERLOAD *******   (VERSION 1.5)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                    OVERLOAD DATA CHECK
****

******** TRANSVERSE DISTRIBUTION DATA ********

STRUCTURE NUMBER	RATIO
451	.97
579	.90
519	.90
1576	.90
345	.90
753	.90

******* OVERLOAD *******   (VERSION 1.5)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
             NATIONAL BRIDGE INVENTORY FILE
****

************** STATE OF ARIZONA **************

```
ITEM     ITEM
NUMBER   NAME

  08     STRUCTURE NO. .....................  461
  05     INVENTORY ROUTE ..................111000404
  07     FACILITY CARRIED BY STRUCTURE.....I 40; WB
  09     LOCATION .........................10.3 MI WEST OF JCT US191
  11     MILEPOINT ........................323.08
  27     YEAR BUILT/RECONSTRUCTION ........5676
  29     AVERAGE DAILY TRAFFIC ............ 4400
  30     YEAR OF AVERAGE DAILY TRAFFIC ....83
  32     APPROACH ROADWAY WIDTH (FT) ...... 38
  34     SKEW (DEGREES) ...................30
  41     OPEN(A),POSTED(P),CLOSED(C) ......A
  43     STRUCTURE TYPE, MAIN .............201
  44     STRUCTURE TYPE, APPROACH SPANS ...  0
  45     NO. OF SPANS IN MAIN UNIT ........  5
  46     NO. OF APPROACH SPANS ............   0
  48     LENGTH OF MAXIMUM SPAN (FT) ......  30
  49     STRUCTURE LENGTH (FT) ............  142
  51     BRIDGE WIDTH,CURB-TO-CURB (FT) ... 42.0
  53     MINIMUM VERTICAL CLEARANCE .......9999
  57     WEARING SURFACE ..................2
  58     DECK CONDITION ...................8
  59     SUPERSTRUCTURE CONDITION .........8
  60     SUBSTRUCTURE CONDITION ...........8
  64     OPERATING RATING .................244
  66     INVENTORY RATING .................229
  67     STRUCTURAL CONDITION .............8
```

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMSSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                            RESULTS
****

********** NEIF GENERAL INFORMATION **********

    STRUCTURE NO.   461   YR BLT/RECON 56/76
    INVENTORY RT.   111000404   NO. SPANS, MAIN   5
    FAC. CARRIED   I 40; WB   NO. SPANS, APP   0
    LOCATION   10.3   LEN. MAX SPAN   30
    MILEPOINT   323.08   STRUCTURE LEN   142

    STRUCTURE TYPE :   REIN CONC SLAB   (CONTIN)

******** OVERLOAD VEHICLE INFORMATION ********

              L.L. MOMENT   AASHTO   AASHTO LOAD
                PER LANE   IMPACT   DISTRIBUTION
                 (K-FT)   (LANES)

    EXT SPAN   213.56   1.30   .0914
    INT SPAN   201.29   1.30   .0862
    BENT   -185.06   1.30   .0887

********** SPECIAL LEVEL 2 ANALYSIS **********
           (HINGES NOT CONSIDERED)

    EXTERIOR TO INTERIOR SPAN RATIO   .817

              MOMENT - DEAD   L.L.MOMENT   IMPACT   TRAN.
              CAPACITY LOAD   PLUS IMP.   RATIO   RATIO   OVLDRR

    EXT SPAN   34.56   25.37   1.00   .97   1.40
    INT SPAN   35.46   22.56   1.00   .97   1.62
    BENT   40.39   -21.35   1.00   .97   1.95

    CONTROLLING OVLDRR =   1.40 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                NATIONAL BRIDGE INVENTORY FILE
****

************* STATE OF ARIZONA **************

     ITEM   ITEM
    NUMBER NAME

     08   STRUCTURE NO.   539
     05   INVENTORY ROUTE 111000402
     07   FACILITY CARRIED BY STRUCTURE.....I 40; EB
     09   LOCATION ....7.9 E JCT SR 77
     11   MILEPOINT 300.75
     27   YEAR BUILT/RECONSTRUCTION 5900
     29   AVERAGE DAILY TRAFFIC 4600
     30   YEAR OF AVERAGE DAILY TRAFFIC 83
     32   APPROACH ROADWAY WIDTH (FT) 38
     34   SKEW (DEGREES) 15
     41   OPEN(A),POSTED(P),CLOSED(C) ......A
     43   STRUCTURE TYPE, MAIN 505
     44   STRUCTURE TYPE, APPROACH SPANS ... 0
     45   NO. OF SPANS IN MAIN UNIT 10
     46   NO. OF APPROACH SPANS   0
     48   LENGTH OF MAXIMUM SPAN (FT) 32
     49   STRUCTURE LENGTH (FT)   322
     51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 30.0
     53   MINIMUM VERTICAL CLEARANCE 9999
     57   WEARING SURFACE 2
     58   DECK CONDITION 8
     59   SUPERSTRUCTURE CONDITION 8
     60   SUBSTRUCTURE CONDITION 8
     64   OPERATING RATING 241
     66   INVENTORY RATING 234
     67   STRUCTURAL CONDITION 8

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.


EXAMPLE PROBLEM 4: ANDERSON TRUCKING


*******************************************************************
                            RESULTS
*******************************************************************


********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.                    539      YR BLT/RECON  59/ 0
    INVENTORY RT.              111000402      NO.SPANS,MAIN    10
    FAC. CARRIED         I 40; EB            NO.SPANS,APP      0
    LOCATION       7.9  E JCT SR 77          LEN. MAX SPAN    32
    MILEPOINT                     300.75      STRUCTURE LEN   322

    STRUCTURE TYPE : P/S CONC  BOX-M (SIMPLE -NBIF DEFAULT)


********** RATING VEHICLE INFORMATION ********
                  HS20 TRUCK

    OPERATING WEIGHT        (TONS)   =        41.00
    WT. RATING VEHICLE      (TONS)   =        36.00
    RF: OPERATING     (NBIF OVERWRITE) =      -1.14

              LIVE LOAD MOMENT PER LANE (K-FT)  AASHTO
    SPAN           EXT          INT       BENT IMPACT

    SIMPLE         NA         312.32        NA   1.30

******** OVERLOAD VEHICLE INFORMATION ********

              LIVE LOAD MOMENT PER LANE (K-FT)
    SPAN           EXT          INT       BENT IMPACT

    SIMPLE         NA         376.71        NA   1.30 (AASHTO DEFAULT)


************** LEVEL 1 ANALYSIS **************
                                              SPAN RATIO   1.000
            MOMENT          IMPACT  TRAN.
            RATIO CONTIN    RATIO   RATIO OVLDRR

    SIMPLE  1.21   1.00     1.00     .80   1.18

    CONTROLLING OVLDRR =       1.18 (NOTE- POSITIVE MOMENT CONTROLS)

         ***** THIS BRIDGE IS A GO *****
```

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                  NATIONAL BRIDGE INVENTORY FILE
****

************** STATE OF ARIZONA **************

ITEM   ITEM
NUMBER NAME

    08   STRUCTURE NO. 519
    05   INVENTORY ROUTE 111000402
    07   FACILITY CARRIED BY STRUCTURE.....I 40; EB
    09   LOCATION ....1.8 MI E OF JCT SR 87
    11   MILEPOINT 259.60
    27   YEAR BUILT/RECONSTRUCTION 5880
    29   AVERAGE DAILY TRAFFIC 4850
    30   YEAR OF AVERAGE DAILY TRAFFIC 83
    32   APPROACH ROADWAY WIDTH (FT) 38
    34   SKEW (DEGREES) 20
    41   OPEN(A),POSTED(P),CLOSED(C) ......A
    43   STRUCTURE TYPE, MAIN 502
    44   STRUCTURE TYPE, APPROACH SPANS ... 0
    45   NO. OF SPANS IN MAIN UNIT 8
    46   NO. OF APPROACH SPANS 0
    48   LENGTH OF MAXIMUM SPAN (FT) 51
    49   STRUCTURE LENGTH (FT) 402
    51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 42.0
    53   MINIMUM VERTICAL CLEARANCE 9999
    57   WEARING SURFACE 2
    58   DECK CONDITION 8
    59   SUPERSTRUCTURE CONDITION 8
    60   SUBSTRUCTURE CONDITION 8
    64   OPERATING RATING 233
    66   INVENTORY RATING 230
    67   STRUCTURAL CONDITION 8

```
******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.
```

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

```
**********************************************************************
                              RESULTS
**********************************************************************
```

********** NBIF GENERAL INFORMATION **********

```
    STRUCTURE NO.                    519     YR BLT/RECON  52/30
    INVENTORY RT.              111000402     NO.SPANS,MAIN      3
    FAC. CARRIED        I 40; EB             NO.SPANS,APP       0
    LOCATION      1.6 MI E OF JCT SR 97      LEN. MAX SPAN     51
    MILEPOINT                     259.60     STRUCTURE LEN    402
```

STRUCTURE TYPE : P/S CONC STRG (CONTIN -NBIF OVERWRITE)

********** RATING VEHICLE INFORMATION ********
                      HS20 TRUCK

```
    OPERATING WEIGHT       (TONS)   =        33.00
    WT. RATING VEHICLE     (TONS)   =        36.00
    RF: OPERATING   (NBIF OVERWRITE) =         .92
```

| | LIVE LOAD MOMENT PER LANE (K-FT) | | AASHTO | |
SPAN	EXT	INT	BENT	IMPACT
SIMPLE	NA	638.00	NA	1.28
THREE	467.53	403.92	-345.09	1.28

******** OVERLOAD VEHICLE INFORMATION ********

| | LIVE LOAD MOMENT PER LANE (K-FT) | | | |
SPAN	EXT	INT	BENT	IMPACT
SIMPLE	NA	647.42	NA	1.28 (AASHTO DEFAULT)
THREE	483.55	350.96	-483.77	1.28 (AASHTO DEFAULT)

*************** LEVEL 1 ANALYSIS ***************
```
                                         SPAN RATIO   .941
```

	MOMENT RATIO	CONTIN	IMPACT RATIO	TRAN. RATIO	OVLDRR
EXT	1.01	1.02	1.00	.90	.98
INT	1.01	.86	1.00	.90	1.17
BENT	1.01	1.38	1.00	.90	.73

CONTROLLING OVLDRR =   .73 (NOTE- NEGATIVE MOMENT CONTROLS)

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       ***** LEVEL 2 ANALYSIS REQUIRED *****
```

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                    NATIONAL BRIDGE INVENTORY FILE
****

************** STATE OF ARIZONA **************

 ITEM   ITEM
NUMBER   NAME

  08   STRUCTURE NO. 1596
  05   INVENTORY ROUTE 111000402
  07   FACILITY CARRIED BY STRUCTURE.....I 40; EB
  09   LOCATION ....11.6 MI EAST OF JCT SR 99
  11   MILEPOINT 256.95
  27   YEAR BUILT/RECONSTRUCTION 7200
  29   AVERAGE DAILY TRAFFIC 4850
  30   YEAR OF AVERAGE DAILY TRAFFIC 83
  32   APPROACH ROADWAY WIDTH (FT) 38
  34   SKEW (DEGREES) 20
  41   OPEN(A),POSTED(P),CLOSED(C) ......A
  43   STRUCTURE TYPE, MAIN 502
  44   STRUCTURE TYPE, APPROACH SPANS ... 0
  45   NO. OF SPANS IN MAIN UNIT 13
  46   NO. OF APPROACH SPANS 0
  48   LENGTH OF MAXIMUM SPAN (FT) 77
  49   STRUCTURE LENGTH (FT) 1004
  51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 38.0
  53   MINIMUM VERTICAL CLEARANCE 9999
  57   WEARING SURFACE 1
  58   DECK CONDITION 6
  59   SUPERSTRUCTURE CONDITION 8
  60   SUBSTRUCTURE CONDITION 8
  64   OPERATING RATING 245
  66   INVENTORY RATING 240
  67   STRUCTURAL CONDITION 6

****** OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                            RESULTS
****

********* NBIF GENERAL INFORMATION **********

    STRUCTURE NO.   1596   YR BLT/RECON 72/ 0
    INVENTORY RT.   111000402   NO.SPANS,MAIN   13
    FAC. CARRIED   I 40; EB   NO.SPANS,APP   0
    LOCATION   11.6 MI EAST OF JCT SR 99   LEN. MAX SPAN   77
    MILEPOINT   256.95   STRUCTURE LEN 1004

    STRUCTURE TYPE : P/S CONC STRG   (CONTIN -NBIF OVERWRITE)

********** RATING VEHICLE INFORMATION ********
                HS20 TRUCK

    OPERATING WEIGHT   (TONS)   =   45.00
    WT. RATING VEHICLE   (TONS)   =   36.00
    RF: OPERATING   (NBIF OVERWRITE) =   1.25

              LIVE LOAD MOMENT PER LANE (K-FT) AASHTO
    SPAN   EXT   INT   BENT IMPACT

    SIMPLE   NA   1106.00   NA   1.25
    THREE   881.77   722.12   -695.63 1.25

******** OVERLOAD VEHICLE INFORMATION ********

              LIVE LOAD MOMENT PER LANE (K-FT)
    SPAN   EXT   INT   BENT IMPACT

    SIMPLE   NA   1191.40   NA   1.25 (AASHTO DEFAULT)
    THREE   943.20   724.69   -666.52 1.25 (AASHTO DEFAULT)

************** LEVEL 1 ANALYSIS **************
                                            SPAN RATIO 1.000
          MOMENT   IMPACT TRAN.
          RATIO CONTIN   RATIO   RATIO OVLDRR

    EXT   1.08   .99   1.00   .90   1.30
    INT   1.08   .93   1.00   .90   1.38
    BENT   1.08   .89   1.00   .90   1.45

    CONTROLLING OVLDRR =   1.30 (NOTE- POSITIVE MOMENT CONTROLS)

          ***** THIS BRIDGE IS A GO *****

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
                NATIONAL BRIDGE INVENTORY FILE
****

************* STATE OF ARIZONA **************

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ITEM     ITEM
NUMBER   NAME

  08     STRUCTURE NO. .....................   845
  05     INVENTORY ROUTE ...................111000404
  07     FACILITY CARRIED BY STRUCTURE.....I 40; WB
  09     LOCATION .........................15.5 MI W OF SR 99
  11     MILEPOINT ........................229.90
  27     YEAR BUILT/RECONSTRUCTION ........6500
  29     AVERAGE DAILY TRAFFIC .............  4500
  30     YEAR OF AVERAGE DAILY TRAFFIC ....83
  32     APPROACH ROADWAY WIDTH (FT) ......  38
  34     SKEW (DEGREES) ....................  0
  41     OPEN(A),POSTED(P),CLOSED(C) ......A
  43     STRUCTURE TYPE, MAIN .............402
  44     STRUCTURE TYPE, APPROACH SPANS ...  0
  45     NO. OF SPANS IN MAIN UNIT ........  3
  46     NO. OF APPROACH SPANS ............  0
  48     LENGTH OF MAXIMUM SPAN (FT) ...... 104
  49     STRUCTURE LENGTH (FT) ............  238
  51     BRIDGE WIDTH,CURB-TO-CURB (FT) ... 30.0
  53     MINIMUM VERTICAL CLEARANCE .......9999
  57     WEARING SURFACE ...................1
  58     DECK CONDITION ....................7
  59     SUPERSTRUCTURE CONDITION .........8
  60     SUBSTRUCTURE CONDITION ...........8
  64     OPERATING RATING .................269
  66     INVENTORY RATING .................246
  67     STRUCTURAL CONDITION .............8
```

******* OVERLOAD *******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

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                           RESULTS
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********** NBIF GENERAL INFORMATION **********

    STRUCTURE NO.   849   YR BLT/RECON 65/ 0
    INVENTORY RT.   111000404   NO.SPANS,MAIN   3
    FAC. CARRIED   I 40; WB   NO.SPANS,APP   0
    LOCATION   15.5 MI W OF SR 99   LEN. MAX SPAN   104
    MILEPOINT   229.90   STRUCTURE LEN   236

    STRUCTURE TYPE : STEEL   STRG   (CONTIN -NBIF DEFAULT)

********** RATING VEHICLE INFORMATION ********
              HS20 TRUCK

    OPERATING WEIGHT   (TONS)   =   69.00
    WT. RATING VEHICLE   (TONS)   =   36.00
    RF: OPERATING   (NBIF OVERWRITE) =   1.92

            LIVE LOAD MOMENT PER LANE (K-FT) AASHTO
    SPAN   EXT   INT   BENT IMPACT

    SIMPLE   NA   1592.00   NA   1.22
    THREE   768.43   964.77   -848.98   1.22

******** OVERLOAD VEHICLE INFORMATION ********

            LIVE LOAD MOMENT PER LANE (K-FT)
    SPAN   EXT   INT   BENT IMPACT

    SIMPLE   NA   1924.10   NA   1.22 (AASHTO DEFAULT)
    THREE   773.95   1077.48   -915.01   1.22 (AASHTO DEFAULT)

************** LEVEL 1 ANALYSIS **************
                                              SPAN RATIO   .644
        MOMENT   IMPACT TRAN.
        RATIO CONTIN RATIO   RATIO OVLDRR

    EXT 1.21   .83   1.00   .90   2.11
    INT 1.21   .92   1.00   .90   1.91
    BENT 1.21   .89   1.00   .90   1.98

    CONTROLLING OVLDRR =   1.91 (NOTE- POSITIVE MOMENT CONTROLS)

        ***** THIS BRIDGE IS A GO *****

****** OVERLOAD ******   (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING   BY IMBSEN AND ASSOCIATES, INC.

EXAMPLE PROBLEM 4: ANDERSON TRUCKING

****
               NATIONAL BRIDGE INVENTORY FILE
****

************** STATE OF ARIZONA **************

    ITEM   ITEM
  NUMBER   NAME

    08   STRUCTURE NO. 758
    05   INVENTORY ROUTE 130002790
    07   FACILITY CARRIED BY STRUCTURE.....SR 279;FAS 326
    09   LOCATION 08.8M.N.JCT I17
    11   MILEPOINT 296.08
    27   YEAR BUILT/RECONSTRUCTION 6300
    29   AVERAGE DAILY TRAFFIC 3500
    30   YEAR OF AVERAGE DAILY TRAFFIC 83
    32   APPROACH ROADWAY WIDTH (FT) 40
    34   SKEW (DEGREES) 25
    41   OPEN(A),POSTED(P),CLOSED(C) ......A
    43   STRUCTURE TYPE, MAIN 402
    44   STRUCTURE TYPE, APPROACH SPANS ... 0
    45   NO. OF SPANS IN MAIN UNIT 2
    46   NO. OF APPROACH SPANS 0
    48   LENGTH OF MAXIMUM SPAN (FT) 90
    49   STRUCTURE LENGTH (FT) 184
    51   BRIDGE WIDTH,CURB-TO-CURB (FT) ... 30.0
    53   MINIMUM VERTICAL CLEARANCE 9999
    57   WEARING SURFACE 1
    58   DECK CONDITION 8
    59   SUPERSTRUCTURE CONDITION 8
    60   SUBSTRUCTURE CONDITION 8
    64   OPERATING RATING 251
    66   INVENTORY RATING 233
    67   STRUCTURAL CONDITION 8

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******* OVERLOAD *******          (VERSION 1.3)
ADOT OVERLOAD BRIDGE RATING       BY IMBSEN AND ASSOCIATES, INC.
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EXAMPLE PROBLEM 4: ANDERSON TRUCKING

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**********************************************************************
                            RESULTS
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********** NBIF GENERAL INFORMATION **********

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   STRUCTURE NO.                      758    YR BLT/RECON  53/ 0
   INVENTORY RT.                 130002790   NO. SPANS,MAIN     2
   FAC. CARRIED        SR 279;FAS 326        NO. SPANS,APP      0
   LOCATION       08.8M.N.JCT I17            LEN. MAX SPAN     90
   MILEPOINT                     296.08      STRUCTURE LEN    134
```

   STRUCTURE TYPE : STEEL   STRG (CONTIN -NBIF DEFAULT)

********** RATING VEHICLE INFORMATION ********
                HS20 TRUCK

```
   OPERATING WEIGHT        (TONS)  =      51.00
   WT. RATING VEHICLE      (TONS)  =      36.00
   RF: OPERATING   (NBIF OVERWRITE) =      1.42
```

```
            LIVE LOAD MOMENT PER LANE (K-FT)  AASHTO
   SPAN          EXT          INT        BENT IMPACT

   SIMPLE        NA        1340.00         NA   1.23
   TWO           NA        1086.18      -951.75  1.23
```

******** OVERLOAD VEHICLE INFORMATION ********

```
            LIVE LOAD MOMENT PER LANE (K-FT)
   SPAN          EXT          INT        BENT IMPACT

   SIMPLE        NA        1542.90         NA   1.23 (AASHTO DEFAULT)
   TWO           NA        1236.96      -777.18  1.23 (AASHTO DEFAULT)
```

************** LEVEL 1 ANALYSIS **************
                                          SPAN RATIO 1.000
```
          MOMENT         IMPACT  TRAN.
          RATIO CONTIN   RATIO   RATIO OVLDRR

    INT   1.15    .99    1.00    .90   1.38
    BENT  1.15    .71    1.00    .90   1.93
```

   CONTROLLING OVLDRR =   1.38 (NOTE- POSITIVE MOMENT CONTROLS)

          ***** THIS BRIDGE IS A GO *****

5.0 REFERENCES

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7. "State Highway System Log as of January 1, 1983," Arizona Highway System Report #3230-83-1, Arizona Department of Transportation, Transportation Planning Division, 1983.

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12. Wyoming State Highway Department, BRASS Manual, Version 3.2, November, 1982.

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15. "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges," FHWA, January, 1979.