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# Entry Level Construction Engineering: Project Documentation – Part 1. Diaries

by

John E. Kristensen PE., PLS., PMP.



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## **INTRODUCTION**

### **1.1– Entry Level Construction Engineer Duties & Responsibilities**

A Construction Engineer may have the most exciting and interesting job of anyone in Construction. They also have the most diverse responsibilities that include not only knowing their engineering skills but also learning about things ranging from paving techniques to public and owner relationship skills.

We can develop a listing of the "Formal" responsibilities that a construction engineer is accountable for, (Most engineers have seen recruiting handouts describing the duties and responsibilities of the Construction Engineer), however, the "informal" listing needs to remain flexible. So often unique situations develop on a job site that need to be addressed. So often the Construction Engineer is the one person to handle it.

The engineer is part of a team and must drop the written boundaries and do what it takes to make the team the best that it can be. Adopting this positive attitude early in a career will go a long way in career development.

No matter what or where an engineer's initial assignment may be, look at it in a positive light. Look to help people, and they will look to help you.

The real learning comes on the job site. Talk to people in the field and on the office staff. As you are going around to measure daily quantities, stop to ask the bridge superintendent how the deck pour is going, or why he formed the piers in this particular fashion. Communicate your questions about charging items into the cost to the office manager or Project engineer.

The worst thing any of us can do or say is "That's not my Job". Stay Flexible in your Thinking, Always Think Positive, Be a Team Player.



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The overall responsibility of the Entry Level Construction Engineer is to assist the Project team to accomplish a financially profitable Project, completed on time, in a safe manner, and meeting (at a minimum) the specified level of quality. Specific duties will be to assist the **Project Engineer** in the daily engineering tasks. The following list represents a few of the duties performed by Entry Level Engineers on a Project:

- To work with the Project Manager and Project Engineer in the planning of the work. This could include using a Primavera generated CPM or another scheduling medium. It may also include scheduling of subcontractors and/or material deliveries.
- To keep accurate quantity records of completed work to help in generating accurate Project unit costs. This includes supervising to ensure proper charge codes for labor, equipment, and material.
- To organize and supervise the survey work required on the Project. This could include working with state-of-the-art GPS equipment.
- To assist with the preparation of agreements with property owners for the purchase of borrow, gravel, and the rental of land and buildings.
- To assist with resolution of problems arising with subcontractors, owners, utility companies or adjacent landowners.
- To provide measurements, drawings and Diary entries to document and support interest involving accidents or claims.
- To complete any quantity take off and calculations from the plans to ensure the proper progress of the work.
- To assist management in estimating and pricing potential new Projects.
- Draft RFI's, RFC's, Transmittals, Submittals, and other contract document related correspondence

Each of these items could be a course for the Entry Level Construction Engineer, this Course will concern with Project Documentation: Part 1. - Diaries.

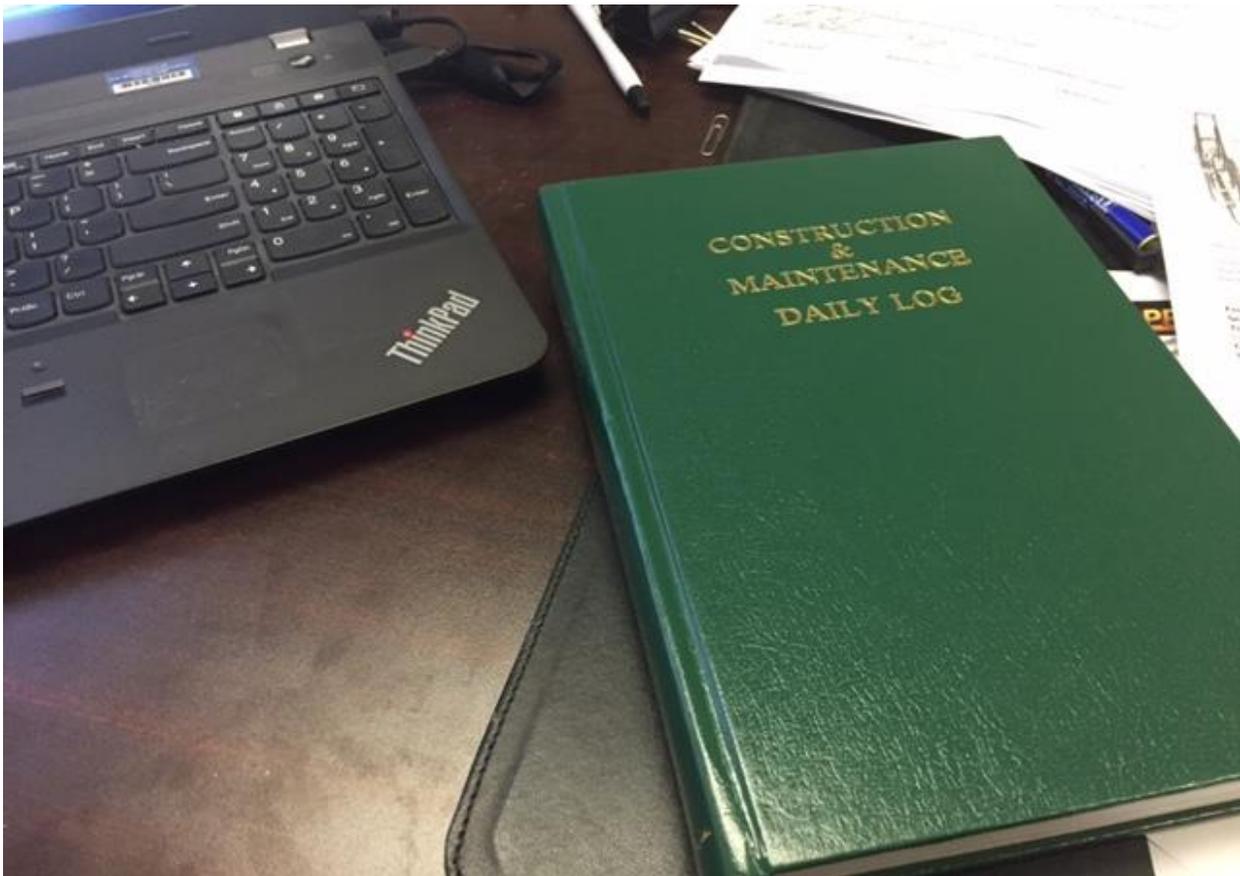


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## 2.1 - General

### Diaries



Any size Project requires a huge effort to start up, operate and finalize. There are always a lot of issues that arise, either with the owner, the unions, the utility company, etc., the list goes on and on. Much of the problem resolution is done with written documentation of conversations, agreements and the like. These documents record the happenings of the



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Project, and with proper filing and copy distribution, there is an accurate record of most things in case of any problems in the future.

However, there are always a lot more things that get discussed and not written. This happens for various reasons. Sometimes a letter or email takes a few days to get the facts together to write a meaningful document. Other times, things happen in a piecemeal fashion, and these individual events need to be recorded before a case for written documentation occurs. That's where a Diary comes into play. It gives us an avenue to record information vital to the Project that, for one reason or another, can't be put on paper, at least not yet.

## **2.2 – Diaries Introduction**

There are two (2) types of Diaries that are typically kept for a Project:

- (1) The Official Project Diary
- (2) Personal Diaries.

It should be the responsibility of the most senior engineer on a Project to maintain the official Project Diary. This doesn't mean that he or she must be the writer of the Diary or that this will be the only Diary, but there should only be one OFFICIAL Project Diary and one person to monitor the content. Many times, the responsibility for maintaining proper entries into this Diary is delegated to an entry-level engineer. This is done for a host of reasons. The importance of having this responsibility should not be underplayed. The person delegated to maintain the official Project Diary must be familiar with all the issues involved with the Project, while the senior engineer responsible for monitoring and approving the entries must be extremely familiar and "in the loop" on all issues, on a daily basis.



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The official Diary is different from Personal Diaries in that it records the activities and events of the whole Project and it becomes part of the Project permanent records. This may include information known first-hand by the writer or is relayed to the writer by another individual with first-hand knowledge regarding meetings they attended or conversations they had with the owner or other pertinent personnel. Over the course of the Project, more than one individual may be responsible for entries into the Project Diary, but only one person at a time should be responsible for it. Whereas, Personal Diaries record the records and events of an individual. Only the individual whose name is on the book can make entries into a Personal Diary. However, diaries are important legal documents and both types of diaries are subject to subpoena in a court of Law. The official Diary should meet certain requirements, as outlined below, as opposed to a Personal Diary that is typically less formal.

First and foremost, a Diary needs to be legible. There is no sense putting a lot of time and effort into a Diary, and not being able to use it because it can't be read. Remember, most Diary entries may not be referred to for a year, or longer and will probably be read by someone other than the writer. Whether printed, written, or digital, the lettering must be clear and legible, and in INK. A pencil is erasable and, in some instances, may not be considered admissible evidence in court.

Second, think about the entries you are going to make before you write them into the Diary. Since the Diary should be a bound book or a digitally uploaded file, the pages cannot be removed and rewritten. A messy Diary makes it look like a lot of afterthought changes were made. Although cross-outs or multiple uploads are allowed, it is best to make every effort to do it right the first time.

Third, be accurate in your statements. It may sound great to make some bold statement about your opinion concerning a job problem and what you know or don't know about it, but this typically will only lend doubt to the whole Diary if any entries are found to be incorrect or inaccurate. It is,



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however, important to be specific if you know the details. If there is a problem with concrete strength and you know first hand some details about the problem that can provide support at a later date, write it down clearly with specific details. It is better to say:

The flexural strength for the beams on NB mainline from Sta 345+90 to 405+23, based on 7-day breaks, was 650 psi.

Then to say:

The flexural strength of the mainline beams broken today was 650 psi.

Fourth, remember all Diaries are subject to discovery in a lawsuit. Do not write subjects in Diaries that are irrelevant, entertaining, or meant to be a reminder for ourselves. These types of statements may look suspicious or give a different tone to the facts. They may also be hard to defend in a court of law. **BE CAREFUL WHAT YOU WRITE IN YOUR DIARY.** Stick to the facts and write as though that page might become public knowledge.

Fifth, fill in the entries for your Diary every day. Set aside a time that works for you each day and take the time to fill the Diary out correctly. Usually, late afternoon is the best time, just before quitting time. This way all the events of the day are fresh and key Project personnel should be available to exchange information from that day and the anticipated information for the next day. Whatever times you chose, get into a routine. Use that same general time each day, so you don't forget. Just like eating lunch or dinner!

Not everyone needs or even should keep a Diary. Minutes of meetings coupled with daily planner calendars many times replace the need for a Diary. Whether individuals keep Personal Diaries or not, there should be an OFFICIAL Diary kept current for each and every project.



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### **3.1 – Official Project Diaries**

#### **Official Diary:**

Aside from the fact that the official Diary is a record of the happenings of the whole Project, let's look at the components that are required to make up such a document. First, the official Diary needs to be in the official book or program file. Books can be readily obtained at most office supply stores or online and are usually a bound, hard covered, and a structured document. You cannot remove or add pages to the book, so be careful to include all information for each date when you make your daily entries.

Various Diary programs are available for tablets and PC's, to not be repetitive and for simplicity, the course's text will be written for a paper book Diary. However, the statements are similarly applicable to digital format.

Second, the Diary is structured, in that it requires specific information be included each and every day, even if that particular section is just labeled N/A for "not applicable". The required information may be labeled by name or by a corresponding number system of subjects as exemplified later in the section but should be in the same order each day. If there is not enough room on the front lined page, go over onto the back of that same sheet. Make every effort to keep each day's events on ONE sheet (front and back if required), however, if you must go onto a second sheet, it must be the NEXT sheet in the book.

Third, before we look at specifics, there are three things the official Diary must include:

- 1) Entries must be in ink
- 2) Corrections must be initialed
- 3) Each page/daily entry must be signed



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The book should contain a general Project information page. This page would include the official Project name, Diary volume, and dates of duration. A Project of long duration with a need for more than one Diary book, each volume should be labeled as 1, 2... etc on this page along with the dates contained in that volume.

The entry pages should be structured with the information categories to be reported each day. These categories should be listed by number or heading (your choice) and listed in the same order each day.

One category may be weather information to be recorded. Reporting the daily weather conditions accurately is important for several reasons. Many owners provide the contractors with workdays to complete their contracts. If the weather is not suitable for the major items of work, the day may not be counted as a workday. Other temperature restrictions make the day eligible or ineligible for activities such as curing time on concrete. High and low temperatures for each day need to be reported. They do not have to be to the exact degree but should be close. Again, this info may make a claim more justifiable if things like paving days need to be calculated. IT IS WORTH KEEPING THIS INFORMATION AS ACCURATELY AS POSSIBLE.





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an apparent claim or problem with the Project or specific item of the Project, it may suffice to list activities as follows:

- Concrete pavement — NB
- Asphalt paving — off-ramp NB at RT 15
- Curb and gutter
- Form Abutment 2 at Bridge 638

Specific information regarding the location and quantity of the Northbound concrete pavement, asphalt paving, C&G or Bridge 638 forming can be found in the job's quantity record books which are detailed later in this course.

If there is a claim or some litigation pending that you are aware of, you may have to be more specific with the narrative of the affected item. Work stoppages due to lack of concrete or stone are worth noting. Include the time of the stop and restart. But don't get too specific here, later on, in item 7, there will be time to express all delays in more detail.

2. SUBCONTRACTORS: List any subcontractors working that day, what they are doing, and where they are doing it. List if they are not working and should be. Again, list the primary subs first, and smaller subs last.

3. OWNER CONVERSATIONS: Again, depending on whether the Project appears to be heading for litigation or not will determine the need to record every word spoken between the two parties. Here in the official Diary, conversations of significance between the owner and **All** management personnel (Not just the person keeping the Diary) is important. It does not have to be word for word unless there are particular words that are



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important. On important issues, include by name the person speaking and the person the information was told to.

Statements like:

The State told us today that we could use the clay source from the east end of the job

May become controversial if we have moved 100,000 CY and find that the PI won't stay within acceptable range. Especially if no one from the state will admit to giving this permission.

Issues/direction received in writing will stand on their own, and unless the date received ties to other important information being recorded in the Diary, the information does not have to be recorded/duplicated in the Diary.

4. UTILITY COMPANIES: Problems with utilities show up on almost every job, and often times result in some form of a claim. Since contractors do not usually have contracts directly with the utility company, most communications with them are either via the telephone or at a Project progress meeting. Documentation here is crucial. Include both first and last names and title if possible.

Also, most state laws require contractors to notify a "utility coordinator" such as "Miss Utility" or "Call before you dig" X number of days before any below groundwork is started. This allows that utility provider to mark out their lines and helps prevent accidental breakage or needless repair costs. Most of the utility coordinators provide the caller with a Confirmation Number that records the call. That number should be clearly recorded in the Diary.

This is also a good time to ask if they need to be called in again to update the marks at any specific interval.

Worked performed each day by each different utility should also be noted here.



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5. **LABOR ORGANIZATIONS:** These conversations will most likely occur between the Project manager and/or representatives of a collective bargaining unit. Not all Projects will be under these agreements. Again, many conversations may be held, only those having Project significance should be listed here. Include names, location and any action agreed to.

6. **EXTRA WORK:** Listed here should be any verbal arrangements to do extra work on the Project, and a listing of the extra work actually performed this day. Extra work in this application is defined as work to be paid under force account or contested under an established unit price. Work included under an established supplemental agreement or purely a quantity overrun is not defined as extra work. Same rules apply here as before relating to names and description detail.

7. **DELAYS:** This could be a big item or could simply be listed as "None". Written correspondence in most cases will document the overall picture, the Diary entries need to identify daily developments and extent of delay. Be careful to report the facts as they happened, leaving Personal opinion out of the Diary. Enough should be written to clearly document the situation(s). Once a supplemental agreement is accepted by the owner, the issue is no longer considered a delay. Be careful not to duplicate written documentation that has already established time extensions, costs, etc.

8. **SAFETY:** We all know the importance of working safely, but it is also important that we document the efforts that we have made. It is important to document topics of project or management safety meetings, the fact



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that safety inspections were held, or persistent or serious problems. It is also important to document the owner's response to safety issues. A book containing all safety reports and /or inspections should be kept separate from this Diary.

9 OTHER: This header includes just that, everything else that happens on the Project of any significance that is not listed above. Documenting important visitors to the Project, comments or concerns by local police, dealing with roadway maintenance personnel, etc., etc..

Most importantly, remember not every word that is spoken or heard about a subject needs to be put in the Diary. Quote when you can but be accurate. Not every topic has to be recorded either. Events that are not problematic usually don't have to be recorded. Just because a density test on the fill fails, doesn't mean we will file a claim or that it needs to be recorded in the job Diary. But by the same token, if a pattern develops, the topic may become noteworthy. A good dose of engineering judgment really makes the difference when it comes to Diaries.



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### 4.1 – Personal Diaries



Typical calendar page of Personal Diary (left), typical entry page Personal Diary (right)

The information written in Personal Diaries will vary significantly from the official Project Diary. These Diaries contains information to refresh memories about events that occurred throughout the year that affected yourself as an Engineer. Say you are an engineer on a Project in Virginia, and you are asked to help bid a Project in Texas that requires a trip to that



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state. All information about your dealings for the trip will be recorded in the Personal Diary on the dates you were there. The official Project Diary should not have this information unless the trip was specifically to benefit that Project.

You can also give your opinions in your Personal Diary. But be careful what you write. You may be held accountable for what is written at some later date. For example, never give an opinion as to who was at fault in an accident - you may regret it later.

Personal Diaries do not have to have any particular structure to them, but the same "general" rules apply as to the official Project Diary. (entries in ink, legible, etc.) Items involving family or other more Personal notes can be incorporated into this Diary if you wish but remember they may get read by others if your Diary is subpoenaed.

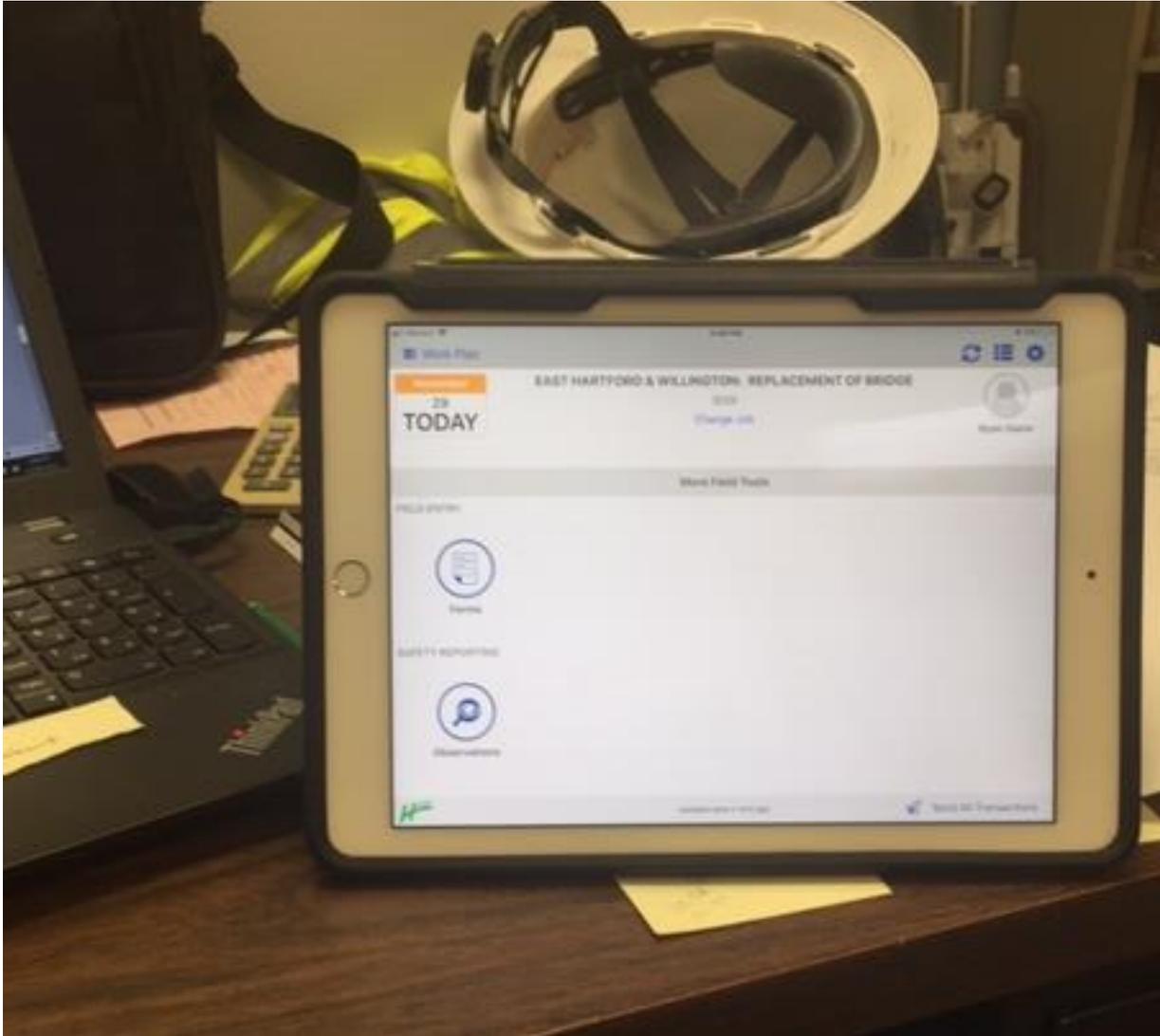
Many people do not keep or record a Personal Diary. Although most corporations recommend keeping one, the decision is solely to be made by each individual.

One last thought with Diaries. At the end of the Project, a Personal Diary goes with the writer and continues to record events as they take place on other jobs, etc. until the end of the year. They are then kept in the writer's possession. The Official Diary ends on the date of final acceptance of the Project or beneficial occupancy, depending on the owner, and should be kept with the other Project record documents.



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## 5.1 – PDF Excerpt from a Digital Diary Manual

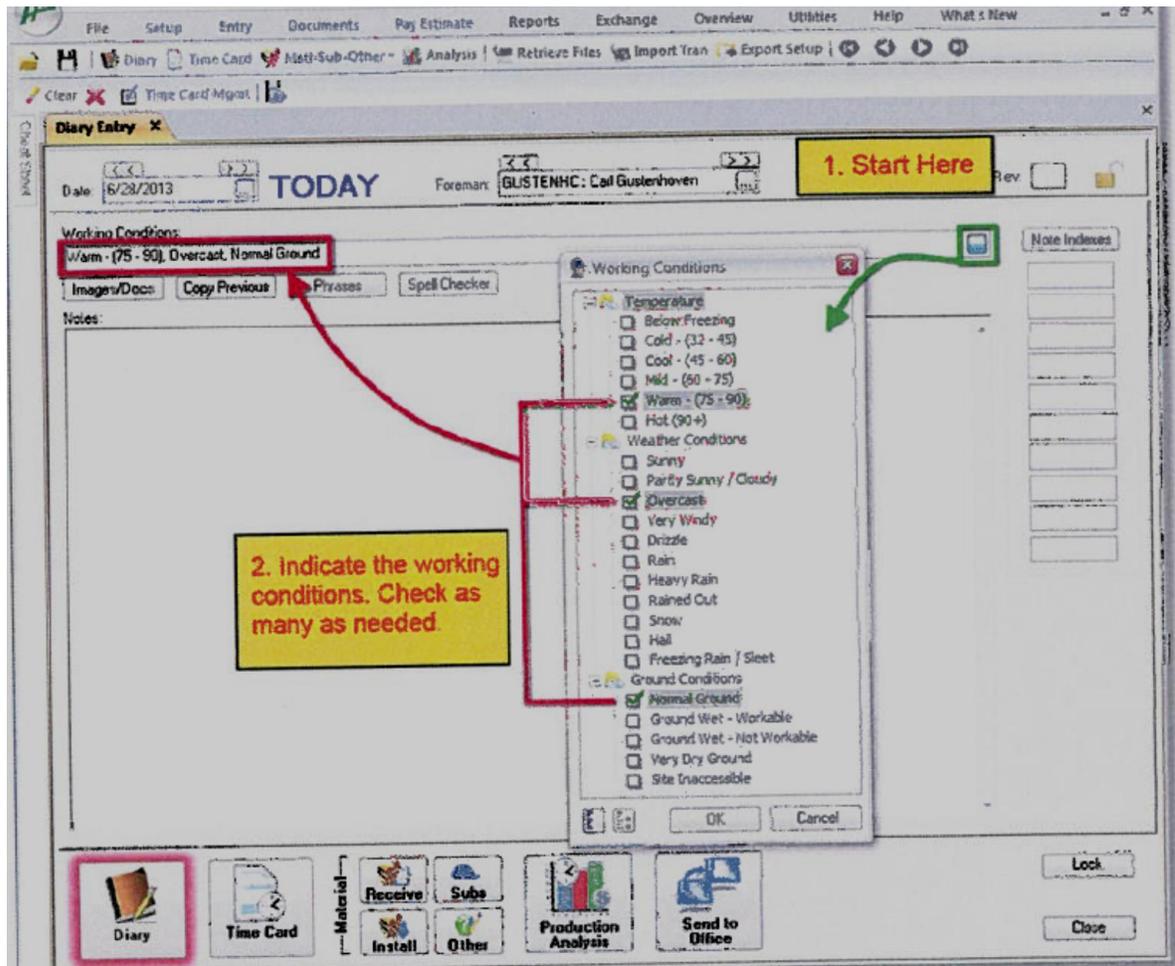
- ❖ The next pages are copied and pasted from a leading digital quantity book instructional manual. They did not copy & paste very well but



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that is not the intent of their inclusion. Hopefully they are clear enough to show that drop down menus, windows, and auto-fill areas are available that make these tools user friendly and easy to navigate.





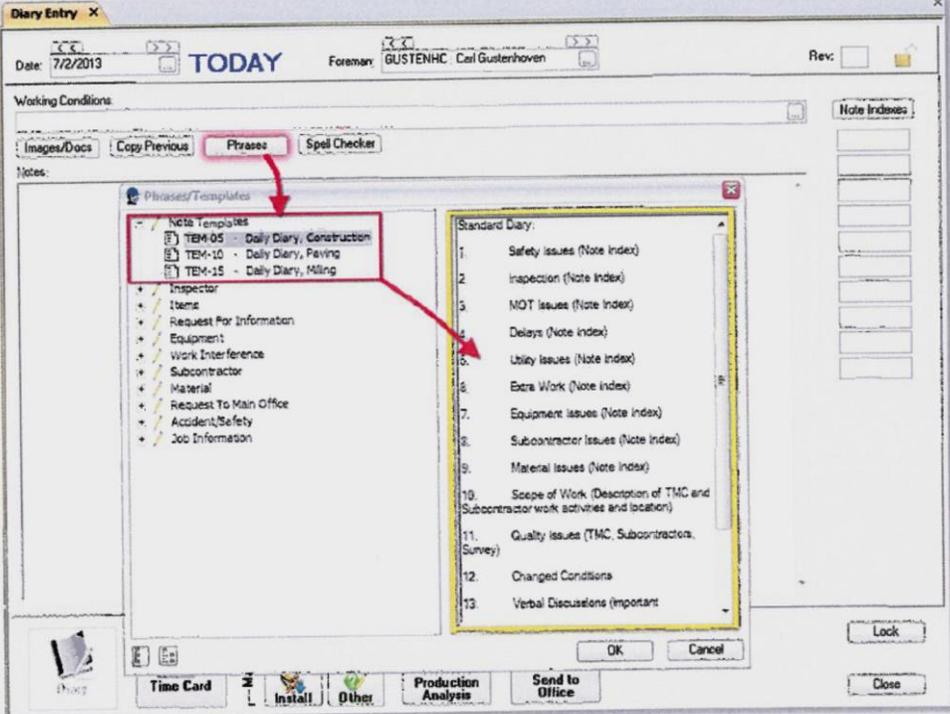
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**Step # 2:** select a *Note Template* and enter your daily notes into the **Standard Diary**.

1. In the *Main* screen under the *Working Conditions* input box, click on the **'Phrases'** button. The **Phrases/Templates** selection box opens.
2. On the left hand panel, click  to open the **Note Templates** and display a list of Middlesex templates for you to use. Select a template that pertains to your work group. (e.g., Construction, Paving, or Milling). Once a template has been selected, the template contents will appear in the right pane
3. Click the **OK** button to accept the template and place it in the **Notes** section.

*In the example below, template; TEM-05 – Daily Diary, Construction is selected and diary notes specific to that template are displayed in the right pane.*



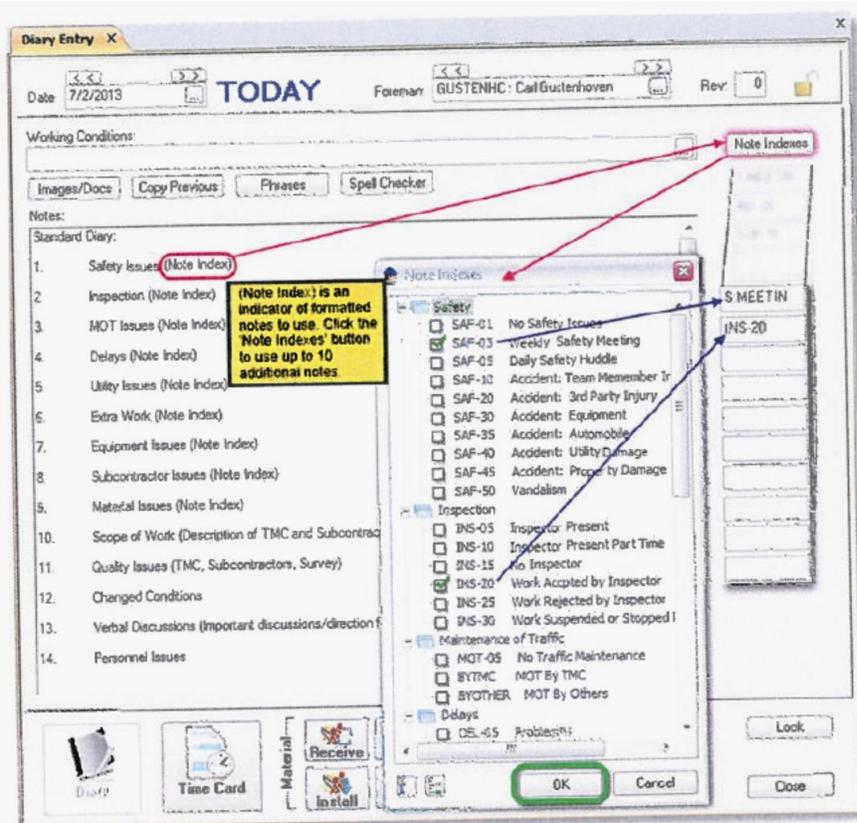
**Attention:** It is important to understand that the **Daily Notes** in the Diary are different from the **Cost Code Notes** entered in the Time Card.

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Once the **Notes** section is populated with your selected template, you can enter your daily notes on each numbered line that applies. In the example below, the **TEM-05 - Construction Daily Diary** notes have 14 separate lines for you to enter information on. The first nine lines are looking for information in a specific format. No matter which of the three templates you chose to work with (i.e., Construction, Paving, or Milling), you'll notice a word or words within parentheses ( ). This is referred to as an **indicator**, and it is looking for specific information.

*In the example below, the parentheses indicator ( ), is looking for formatted notes located in the '(Note Index)' menu. Click the 'Note Indexes' button for a complete selection menu.*



Click the **Note Indexes** button to display a list of notes to select from. Place a check mark in each category that pertains to the day's activities. (You may not need to use all the categories listed). The identifying codes will appear in the 10 boxes at the right of the screen.  
**Note:** no more than 10 codes can be selected.



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Besides the pre-formatted notes that you can select from, additional notes and comments can be typed in separately to each line item (1 – 9). The remaining line items (10 – 14) do not use the pre-formatted notes, and are strictly for your hand written notes to be added as necessary. **Note: remember the word or words within parentheses ( ) is the indicator of what information is required for that line item.**

In the example at the right for the **Daily Diary of Paving Operations**, the *indicator* is a **Yes or No (Y/N)** answer for line item 1.1

Notes:  
Daily Diary for Paving Operations:

- 1. Safety:
- 1.1 Were there any accidents / incidents on any project you were working on? (Y/N)
- 1.1.1 If yes, was an accident / incident report signed and submitted? (Y/N)
- 1.1.2 If no, please explain:
- 1.2 Did you have any safety concerns with anyone or anything in the company? (Y/N)

**Photographs** – Whenever you take photographs of the job, be sure to make a note in the diary and state where the photographs are stored.

## 6.1 - Conclusion

Documentation control must be a high priority on all projects. Argumentatively, more money can be lost by sloppy or inaccurate document control than just about any other function of an engineer on a construction project.

One thing that many times gets overlooked is taking the time to look at the reasonableness of what you are doing and what you have written down. If you take the time to look at quantities, and think about what they are representing, we can catch a lot of errors before they get out to everyone else. It is highly unlikely that we could perform 25,000 SY of stone placement in a week if the absolute maximum daily production is 3,000 SY.

It is better to have more records than you need, than not enough. The same rules apply to documentation control as to quantity books, there is no sense spending a lot of time recording information if it isn't recorded legibly enough to be read.

**Be neat, be organized, and be accurate.**