

Comparing NAWH and “Relief Factor” Calculations

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This is the tenth article on jail staffing analysis, exploring the methodology developed by the National Institute of Corrections and presenting enhancements developed since NIC’s latest workbook¹ was published. In this article, we take a break from our examination of scheduling challenges to clarify some of the math associated with relief calculations and to introduce some new tools.

We interrupt our examination of schedules to respond to a groundswell of requests to clarify the relationship between Net Annual Work Hours (NAWH) and the older concepts of a “Shift Relief Factor” (SRF) and “Relief Factor” (RF). This article addresses the confusion and provides examples, formulas and access to a new tool.

The NAWH methodology was introduced by NIC in 1987, providing a more accurate and versatile tool to calculate the math associated with relieved posts and positions. The end product of the NAWH calculations has many and varied uses, and is expressed as “hours” rather than “days.” Figure 1 provides a side-by-side comparison of the two methodologies.

Figure 1: Comparing NAWH and Relief Factors

	Relief Factor (RF)	Net Annual Work Hours (NAWH)
Unit of Measure	Days	Hours
Changes with shift configuration?	Yes, a new RF must be calculated for each different shift length	No, applies to all shift configurations
Number of “Time Off” Deductions Typically Considered	8 to 10 categories, measured in days	15 and more, in some agencies more than 30 categories of deduction are included, measured in hours
Product of the calculation	A number that describes the number of full-time employees needed to cover a specific shift with relief	The number of hours that each classification of employee is actually available to work his/her post annually
Uses	Calculates numbers of FTEs needed for a post/position	(1) Defines FTE for each classification of employee (2) Used as denominator to determine FTEs needed for varied coverage patterns (3) Provides guidance for shift construction and employee assignment

¹ **Staffing Analysis Workbook for Jails**, First Edition. Rod Miller and Dennis Liebert. National Institute of Corrections, Washington D.C. 1987. Second Edition published 2003. The NIC methodology has been embraced by jails throughout the United States and has also been adopted by police, fire, transportation, health care and nursing home operations.

Some jurisdictions still use the relief factor methodology, and need to be able to convert NAWH to RF for comparison purposes. Similarly, those who have converted to NAWH may need to compare previous RF calculations with their newer NAWH findings.

What a Relief!

Remember, either methodology is only used when a post or position is relieved. Relief means that a post or position is filled by another employee when the primary person assigned to it is not able to work. Relief sometimes implies that a post or position is staffed every day of the week. Relief is synonymous with “continuous.”

When a post or position is relieved, it is important, and difficult, to determine what budget resources are needed to staff it.

Definitions

A "relief factor" attempts to answer the question: "How many full-time staff must I have in my budget to provide continuous coverage for a relieved post, using a specific shift configuration (length of shift)?" Relief factors are usually calculated for posts that are operated 24 hours daily, every day of the year. But calculating a relief factor becomes very difficult, and less accurate, when a variety of post configurations are considered. Some posts operate for only part of the 24-hour day, and some posts are not operated every day of the week.

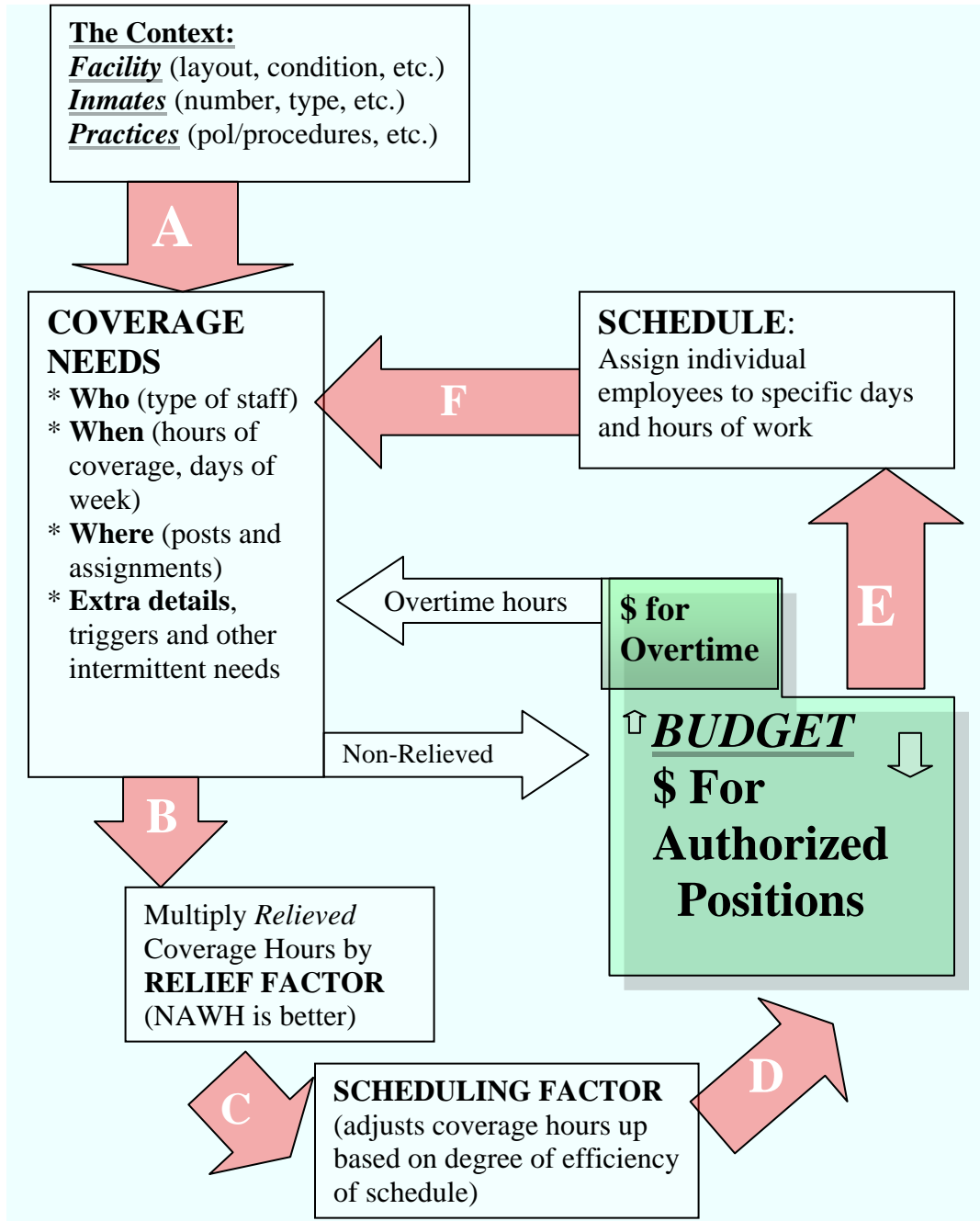
In the past, a typical jail had only one shift configuration, such as 5, 8-hour shifts. But we have found that one size does not fit all, and the modern jail typically uses a variety of shift configurations to efficiently address needs. Using a relief factor in this context is often confusing—and is often inaccurate. A case in point: one county recently concluded it only required 4.1 full-time positions to staff 2, 12-hour shifts, 365 days per year (in fact, they needed 5.48). They made math errors when they tried to adapt their old shift relief factor (derived from 8-hour shifts) to their new 12-hour shifts. This is a common error made as managers try to apply relief factor methodology to alternative shift patterns.

The NAWH method introduced in the NIC Workbook accomplishes the same goals, more accurately, and with much more flexibility. By focusing on the "hour" as the unit to be measured, rather than a shift or a day, the process has been improved. The NAWH methodology also yields a product that is versatile and is effectively used in other areas of the staffing analysis.

What Do These Calculations Tell Us?

As suggested in Figure 1, a Relief Factor is a number that represents the number of full-time employees needed to provide coverage for a specific relieved post or position. An RF calculated for an 8-hour shift does not apply to any other length of shift. Every time the shift configuration changes, the RF must be recalculated—leading to more opportunities for error. The RF calculations are based on the number of “days” a typical employee has off for leave, training, and other activities.

Figure 2: Staffing Analysis Flowchart



The NAWH expresses the number of hours an average employee in a classification (such as Correctional Officer) will actually report for deployment during the year. It is the “net” number of hours that the employee is available to work. The NAWH calculations are based on the number of hours employees are away from their posts with pay. One agency with which we worked recently was able to provide data for more than 30 distinct categories of time away from post, thanks to the efforts of their payroll and human resources colleagues. The more data available, the more accurate the result.

The NAWH figure represents a “full time equivalent” (FTE). An FTE in budgeting jargon refers to the equivalent number of hours worked by a full-time employee for each classification of employee.

Why are these numbers so important?

At first glance, these calculations seem to only have relevance to the budget process. That’s true. But the budget is the source of all of our staffing resources—full-time employees, part-time employees, and overtime. If you do not ask for sufficient resources at the beginning of each budget year, you will certainly run short before the year ends. Further, if you want to increase training, for example, you will need to adjust the NAWH to ensure that funds are requested. And securing approval for your budget request will be bolstered by the comprehensive and accurate NIC methodology. The budget director in a large jail system recently asked for a “chain of evidence” that tied each dollar in the staffing budget request, to the hours and posts worked in each facility. The NIC process easily provided that level of detail, and connected the coverage needs to scheduling, and eventually to the budget request.

Figure 2 describes the process through which staffing needs are determined, budgets are forged, and staffing resources are eventually deployed. NAWH and RF both address the calculations shown in the arrow labeled B. But the NAWH is also used in other steps in the process, further refining the accuracy of your efforts.

How do I convert and compare?

To compare NAWH and RF, you must be able to convert one to the other. Figure 3 provides a sample of the results when NAWH is converted to SRF and RF.

Figure 3: Example of Net Annual Work Hours (NAWH) Compared to “Shift Relief Factor” (SRF) and “Relief Factor” (RF)

A	B	C	D	E	F
Annual Coverage Hours	Number of hours in a single shift	NAWH	SRF for 1 shift (A ÷ B)	Number of Shifts in 24 Hours	RF for 24hr coverage
2,920 hours (8 hours times 365 days)	8 hours	1,550 hours	1.88	3 shifts in 24 hours	5.65
	8	1,600	1.83		5.48
	8	1,650	1.77		5.31
	8	1,700	1.72		5.15
	8	1,750	1.67		5.01
4,380 hours (12 hours times 365 days)	12 hours	1,550 hours	2.83	2 shifts in 24 hours	5.65
	12	1,600	2.74		5.48
	12	1,650	2.65		5.31
	12	1,700	2.58		5.15
	12	1,750	2.50		5.01

Why would the RF for the two examples (column F) be the same? Does this mean that an 8-hour shift and a 12-hour shift have the same relief factor? Only if they have the same *Net Annual Work Hours*, which is usually not the case because employees who work 12-hour shifts usually work 84 hours in a 14-day pay period, while their 8-hour counterparts work only 80 hours.

The formula is simple, as shown in Figure 4.

Figure 4: Calculating Relief and Shift Relief Factors for 7 Day Posts

Type of Factor to Be Calculated	Formula
1 shift operated 7 days/week	Annual Coverage Hours ÷ Net Annual Work Hours = “ <i>Shift Relief Factor</i> ” (SRF) for 1 shift
24 hour coverage 7 days/week	SRF for 1 Shift <i>times</i> Number of Shifts in 24 hours = “Relief Factor” (RF) for 24 Hours

What if you are not covering 7 days per week? It is a little more complicated, but again, the NAWH figure is the key. You will need to calculate the annual scheduled hours, using the following formula:

$$\text{Number of Hours in Shift } \times \text{ Number of Days/Week } \times 52.14 \text{ weeks} \\ = \text{Annual Coverage Hours}$$

For example, a relieved post that operates 8 hours per day, 5 days per week, would require 2,086 annual coverage hours:

$$8 \text{ hours } \times 5 \text{ days } \times 52.14 \text{ weeks} = 2,086 \text{ annual coverage hours}$$

To calculate the shift relief factor:

$$\text{Annual Coverage Hours } \textit{divided by} \text{ NAWH} = \text{Shift Relief Factor}$$

For example, the 8 hour shift operated 5 days per week in the preceding example, for a classification of employee that has a NAWH of 1,550, would have a Shift Relief Factor of 1.35:

$$2,086 \text{ annual coverage hours } \textit{divided by} \text{ 1,550 NAWH} = 1.35 \text{ SRF}$$

Still confusing, or just too much trouble? Go to www.staffinganalysis.com and download a simple Excel file that we have created. It provides several “fill in the blank” forms that will allow you to convert back and forth. As with all of the resources we describe in these articles, they are free.

Conclusion

Take a look at the NAWH methodology. It works, and it works better than previous tools. It is more accurate and more versatile and it improves the accuracy of budget requests.

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The materials identified in this article, along with many other resources, are available at no cost at our on-line staffing analysis clearinghouse: www.staffinganalysis.com.

The clearinghouse is a service provided by CRS, Incorporated, a non-profit organization (www.correction.org).

Rod Miller has headed CRS Inc. since he founded the non-profit organization in 1972. He is the author and co-author of numerous texts and articles on various aspects of jail planning, design, and operations. For more information, contact him at rod@correction.org, 925 Johnson Drive, Gettysburg, PA 17325, and (717) 338-9100.

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